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ABSTRACT

The evaluation report is one of seven produced for the Occupational Exploration Program (OEP), a series of simulated occupational experiences designed for junior high school students. Describing the pilot testing of the simulation dealing with manufacturing production, the report contains sections describing the simulation context, evaluation procedures, results, and a Reviser's Information Summary (RIS). In the simulation, students set up and put into operation a 38-step assembly line producing extension speakers for transistor radios. Safety rules, administrative procedures, and job training were introduced. Occupational roles included supervisory positions and assembly line production. The experimental design involved two Colorado schools, with a total of four experimental and four control groups involving 77 eighth and ninth graders. Instrumentation included knowledge and affective testing, student and teacher questionnaires, and a panel review. Analysis of variance and other descriptive statistics were employed and reliability estimates were calculated. Analysis of variance results revealed that the simulation did not have a positive impact on student occupational knowledge but did have some positive impact on student occupational preferences. The RIS records and extrapolates trends related to the strengths, weaknesses, and recommendations from all data sources. Appended materials include the evaluation instruments used and a teacher evaluation log. (MW)

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MANUFACTURING PRODUCTION

AN EVALUATION REPORT FOR THE OCCUPATIONAL EXPLORATION PROGRAM

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December, 1974

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ABSTRACT

MANUFACTURING PRODUCTION

EVALUATION REPORT FOR THE OCCUPATIONAL EXPLORATION PROGRAM

By: James W. Altschuld; Sandra Pritz; Janice Lave; Roberta Shively

This report is one of seven evaluation reports produced for the Occupational Exploration Program. The Occupational Exploration Program (O.E.P.) is funded by the National Institute of Education and is a joint development effort of The Center for Vocational Education (The Ohio State University) and the Jefferson County, Colorado public schools. O.E.P. is a series of experiences designed to provide junior high school students with the opportunity to explore occupations. One of the major vehicles for exploration is the simulation technique. In "FY' 1974, 12 simulations were developed and seven of those twelve were pilot tested. This report describes the pilot testing of the simulation dealing with manufacturing. The report contains sections describing simulation context, evaluation procedures, results and a Revisor's Information Summary (RIS). The RIS is useful for a variety of purposes and includes the strengths of the simulation as well as its weaknesses. Below is a synopsis of the specific content of this report.

SIMULATION CONTEXT: In this simulation, students experience various manufacturing occupations. An assembly line requiring thirty-eight steps is set up and put into operation by participants. The students are introduced to safety rules, administrative procedures, a job training program, and a production line. As a result of their participation, the students produce extension speakers that may be attached to transistor radios. The occupational roles include plant superintendent, production supervisor, production coordinator, quality control supervisor, maintenance supervisor, and assembly line workers. EXPERIMENTAL DESIGN: For evaluating this simulation, two schools, one in Jefferson County, Colorado and one in Denver, Colorado were used, each school having two experimental and two control groups. A teacher facilitated the implementation of the simulation with each experimental group. The experimental and control groups consisted of 8th and 9th graders; the four experimental groups totaled 50 students and the four control groups totaled 27 students. A modified laboratory or quasi-experimental setting was utilized for the product tryout. INSTRUMENTATION: A 35 item multiple choice knowledge test, "What Do You Know?", and a 5 item affective test, "What Do You Like?", were administered as pre- and posttest measures of student occupational knowledge gain and attitudinal change. The student post module questionnaire, "What Do You Think?", administered to the experimental group after completion of the simulation, measured student perceptions of the module. Teacher questionnaires and a panel review were used for the purpose of obtaining teacher perceptions of the simulation. ANALYSIS: The knowledge test and affective test results were derived through analyses of variance. Other descriptive statistics were employed where appropriate (i.e., frequency, percentage). Reliability estimates were calculated to obtain the internal consistency estimates of the knowledge test and to determine inter-coder and intra-coder agreement

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for the attitude scale. RESULTS: The ANOVA results reveal that the simulation did not have a positive impact on student occupational knowledge. However, nearly statistically significant ($p < .06$) changes in student occupational preferences occurred. There was almost unanimous response from student questionnaire data that the simulation was fun, interesting, and had a high motivational appeal. Most of the participants learned a lot from the simulation including how to work with other people. REVISOR'S INFORMATION SUMMARY: The RIS was designed to not only assist revisors to assimilate information collected during the pilot-test, but also as a unique way of summarizing the data. The summary is a record of the strengths, weaknesses and recommendations for revisors from all data sources (i.e., student tests, student questionnaires, teacher questionnaires, etc.) Trends have been extrapolated which list the most apparent strengths, weaknesses of the simulation as well as recommendations to be considered in the review of the simulation.

Acknowledgements

An evaluation report is usually a product of the endeavors of many individuals. The authors of this report therefore wish to thank:

1. The teachers, administrators, and students in Jefferson County, Colorado and Denver, Colorado who, by participating in the use of educational materials and in the testing of those materials, made this evaluation report possible;

2. Jon Schaffarzick, Michael Hock, and David Hampson of the National Institute of Education for their support of this effort; and

3. The twelve project staff members identified on the cover, who, by their support, expertise and/or direction contributed to the production of this report.

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Manufacturing Production

I. Brief Description of the Module

This simulation, Manufacturing Production, provides an opportunity for the student to explore and get a feel for whether he/she might like to look further into manufacturing occupations for potential occupational choices. The simulation consists of an Introduction, Preparation (1st session), Participation (five production sessions), and a Summary. Twenty-eight students may opt into the simulation to work in the production of extension speakers (boom boxes) that may be attached to radios. An assembly line requiring thirty-eight steps is set up and put into operation. Of the twenty-eight workers, one is plant superintendent, four are supervisors, and those remaining are product line workers.

The Preview* or Introduction Section takes the form of an illustrated comic book. Two caricatures, Peter and Polly, give an overview describing "The World of Work, Manufacturing Production". They describe specifics of the simulation including the tools, equipment, materials, and kinds of activities that a student might engage in to build extension speakers if he/she were to opt into the simulation. The student is then asked if he/she would like to participate in the manufacturing simulation. A slide tape presentation similar to the booklet is available and may be viewed instead of or in conjunction with the comic book. The preview is scheduled to last about a class period.

*Prior to the preview, the students have seen a slide tape and/or read a booklet on Introduction to Simulation.

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The Preparation Section (Session 1) begins with a slide/tape "Manufacturing Production" which outlines the roles in the simulation and describes an organization chart. It continues with an explanation of the safety rules (which are also provided in comic book form) and directs the students to a handbook of instructions for the job applications ("What Job Would I Like?") The handbook guides a student through the preparation of several forms that help him/her choose and get into a role for the simulation. The student may choose to work in one of the five production areas; Fabrication, Assembly, Inspection, Supervision, or Maintenance. Using an interest scoring sheet the student first works through an interest form from the records file. He/She records his/her scores and continues according to the handbook to work through the preference form, description sheet, job application form and as a last activity obtains a company identification card.

At the end of the Preparation, the job application forms are left with the instructor. Job applications are the final instrument for production area role choices. The instructor checks the job application form for conflicts in role choices. The preparation section is scheduled for about one period.

At the beginning of the Participation Phase (Session 2), a slide/tape "Operation Sheet - The Key To Your Job" instructs the group in the use of 1) operation sheets which direct them through their jobs and 2) training aids (film-o-sound cartridges and talking pages) for specific tasks. Next the group hears a tape "Electing a Plant Superintendent" while simultaneously viewing posters on the same subject. Following

the tape and posters, one of the five students applying for the plant superintendent position is voted into office by the company employees using a plant superintendent ballot. The remaining four candidates receive supervisory positions by drawing from a hat of supervisory selection cards. The supervisory roles are in booklets titled: Production Supervisor, Production Coordinator, Quality Control Supervisor, and Maintenance Supervisor. Finally, a company meeting is held during which purchase contracts are signed, the number of speakers to be produced is decided upon, and the company is given a name.

In Session 3 (and possibly 4) another organizational company meeting is called to order by the plant superintendent. The company employees view a slide tape program on the flow chart, hear a tape on the company handbook and files, and review the company rules of conduct. The supervisors continue their job preparation and training while the remaining employees are instructed to go to the Instructional Materials Center. Between Sessions 3 and 4 the production supervisor and production coordinator should have finished the production time chart in order that production may begin. If they have not, they continue to work on the chart while the remaining workers again go to the Instructional Materials Center.

Assuming the production time chart is complete, the workers are called from the Instructional Materials Center and hired by the supervisors from a "worker pool" according to their ID number from the preference chart. The supervisor of each area then records the workers' names on a worker assignment sheet. Workers are also recycled through the worker pool when their jobs are completed or an opening

comes up that is their first choice on the preference chart. As production workers are hired to do an operation, their first responsibility is to take their training program from film-o-sound 35 cartridges found in the audiovisual files. In addition to his/her work assignment, each employee is responsible for filling out a daily report form.

By Session 5, production is in full swing. Each supervisor should be assuming his/her roles and checking to see that their workers are doing the same. A brief description of each of the supervisor roles follows.

Production coordinator and production supervisor are closely related roles; in fact, they work from different copies of the same handbook during the simulation. The main difference in their responsibilities is that the production supervisor is in charge of fabrication, the production or manufacture of components or parts used in the speaker, while the production coordinator is in charge of assembly, putting together components or parts to form the speaker. They each have the responsibility of establishing a production schedule, hiring production workers for fabrication/assembly, supervising production workers in fabrication/assembly, controlling production, and assisting the plant superintendent.

The quality control supervisor's job has four parts: inspecting, inspector hiring and supervising, safety enforcement, and assisting the plant superintendent. The first part inspection involves completing the proper section of the "first part" checklist that applies to each day's production as well as looking for shoddy or otherwise

unacceptable workmanship. Inspector hiring and supervising involves hiring inspectors from the production worker pool when they are needed and returning them to the pool for reassignment when they are done. Safety enforcement involves general shop safety and operations safety. It is the quality control supervisor's responsibility to become familiar with all the company safety rules and see that all employees are familiar with rules too. During the simulation he is to watch, correct, and report any problems of safety to the plant superintendent. As a plant superintendent assistant, he will be required, as will other supervisors, to assist the plant superintendent upon request.

The maintenance supervisor also has four parts to his job: inventorying tool/equipment/special apparatus; maintaining tools and equipment; supervising equipment and work area cleanup; and assisting the plant superintendent. Tool/equipment/special apparatus inventory requires the maintenance supervisor to complete an inventory sheet and to know the number of tools and equipment on hand as well as where they are. In addition, the maintenance supervisor needs to know the number of work stations (areas where a single operation can be performed) and act as an information source since the individual in this role will know more about the tools and equipment and the special apparatus than anyone else in the company. Tool and equipment maintenance requires a daily check of the tools and equipment to see that they are in good working order. The tools and equipment needed for all operations (1 through 38) are illustrated, and instructions are given for replacement and repair of the tools. Equipment and work area cleanup are important roles

requiring tact and diplomacy on a daily level from the maintenance supervisor. He must oversee the cleanup of machinery and the work area, watch the time, and check for safety during cleanup. As a plant superintendent assistant, he/she needs to be ready to assist the plant superintendent upon request.

The plant superintendent works with other supervisors and staff to keep the manufacturing company organized and the production line moving smoothly. He/She is responsible for resolving the personnel problems, time conflicts, and other problems that may arise in the simulation. Of course, the superintendent may at any given time choose to confer with top management (the instructor) to resolve difficult problems.

Session 6 is a continuation of the production line with all participants continuing in their roles until the desired production quantity is reached. (The production quantity should equal or exceed the total number of speakers company employees contracted for when they signed their purchase contracts during Session 2.)

The Summary provides the students with an opportunity to think about what they have done, where they are now, and where they would like to go in the future in terms of occupational exploration. The summary is divided into three tasks. The first task focuses upon the individual's experience asking such things as: "Did I like the working conditions associated with manufacturing production?" The second task focuses on sharing experiences and personal feelings about what each participant did during the simulation. The superintendent first calls a brief meeting, then the class divides into small groups to work on a presentation describing their roles during the simulation. The groups then come together to hear each other's

presentations. Task 3 of the Summary uses a "decision point" form from the company files to give the participants an opportunity to think about how manufacturing production and other experiences in the simulation have affected their plans for exploring the world of work. The students receive their speakers at the end of the simulation.

Ideally the Manufacturing Simulation would take about 12-13 periods of class time. Given, however, needs such as start-up time, getting-organized time, and clean-up time, the simulation more realistically is scheduled for about 15-18 periods of class time. The breakdown by class sessions is shown on the following page.

TABLE I - Estimated Time Required for Simulation Components

Simulation Component	Estimated Time in Class Periods*
Introduction to Simulation	1 - 2
Preview	1
Preparation	1
Participation	6
Summary	3
Total	12 - 13

(15 - 18 with allowance for preparation and clean-up)

*A class period is assumed to contain a minimum of 45 minutes.

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II. Description of Evaluation Procedures Employed

A. Specific Sample Used

1. Schools

For this module one Jefferson County and one Denver school were used. In each school there were two experimental and two control groups. The schools and the teachers were selected via discussion with administrators and teachers in each of the districts. A brief description* of the schools follows.

Wheat Ridge Junior High School (Grades 7-9), Jefferson County.

Wheat Ridge Junior High School is a small school with approximately 725 students in grades 7-9. Twenty students are classified as mentally retarded. Generally, the school draws its student body from a middle class, blue collar area. About 30 students come from families receiving Aid to Dependent Children (ADC) and many students are from divorced homes. The area of Jeff Co. represented by this school has many older single family houses. There is a sizeable retired subgroup within the area population. The students are primarily white (93%) with the rest (7%) having Spanish surnames. The school reports that standardized test results indicate that school scores are improving and that it is either at or above district norms in most cases.

Lake Junior High School (Grades 7-9), Denver.

Lake is a large Denver junior high school with well over a thousand students. Although demographic data was not available at the time of this writing several factors about the school are known. First, it has a sizeable percentage of students with Spanish surnames.

*Descriptions were obtained by John Radloff of the Jefferson County project staff.

Secondly, in general Lake has a high rate of absenteeism. (As soon as additional data becomes available, it will be appended to this report.)

2. Sample Within Schools

a. Teachers

In Wheat Ridge Junior High School two male industrial arts teachers conducted the simulations. In Lake Junior High School one male industrial arts teacher conducted two separate simulation groups. (Due to difficulty in obtaining questionnaire data from these teachers, further demographic data is not available.)

b. Students

State regulations in Colorado necessitated that a simulation of this type, i.e., one involving a great deal of manipulation of tools, be housed in an industrial arts setting. In Denver and in Jefferson County, classes utilizing the industrial arts facilities consist of all male students. Therefore only eighth and ninth grade male students enrolled in industrial arts classes were in the experimental groups. These students were volunteered by their classroom teachers. To provide for comparable control groups, intact industrial arts classes were selected for the control groups. The classes were generally a mixture of eighth and ninth grade students.

In summary, the sampling was far from ideal. While the procedures for sampling within the two schools were quite similar, the schools themselves were somewhat different. Caution should be exercised when making interpretive judgements about the experimental results of the pilot test.

It also should be noted that experimental results are based only on students who took both the pre and posttest. There was sample loss in the testing of the module as follows:

- Denver experimental groups, of the thirty-five students who started the module, thirty students completed it (fourteen percent loss);
- Jeffco experimental groups, of the twenty-nine students who started the module, twenty students completed it (thirty-one percent loss);
- Denver control groups, of the thirty-six students who took the pretest, twelve did not complete the posttest (thirty three percent loss);
- Jeffco control groups, of the twenty-six students who took the pretest, thirteen did not complete the posttest (fifty percent loss).

Across the four types of situations described above the percentage loss is approximately thirty-one percent. Sample loss is always difficult to account for in an experimental situation. Some students may have been sick or otherwise out of the classroom during the pre or posttesting time. The logistical set-up for the test of this module required that an administrator be present at each testing session. Provisions for follow-up testing of students who missed a session were not feasible given the available manpower in the field. Some students may simply have avoided taking the tests. Students in industrial arts classes may have an especially strong disposition against tests. The sample loss, at any rate, is larger than one would ordinarily like to see. Caution, therefore, should be taken when interpreting the

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experimental results of the pilot test.

B. Types of Classes and Groupings

Given the unique nature of the manufacturing simulation, only existing intact classrooms were utilized. Since the simulation was designed for a maximum of 28 students per group, all class members within an intact classroom participated in the module. The module was tested within the industrial arts area of the two schools. These areas were free from competing influences or distractions and it was felt that students were able to experience the module in the manner intended by developers.

C. Experimental Design as Implemented

Since the industrial arts classes involved in this pilot test had only male students, partitioning of the groups by sex was not possible. Aside from this one difference, the design is basically that stated in the proposal. Schematically the design could be depicted as shown on the following page.

Figure 1 - Schematic of the Experimental Design For The Manufacturing Module

		Pretest	Posttest
Lake (Denver)	Experimental Group #1	S_1* ⋮ S_n	S_1 ⋮ S_n
	Experimental Group #2		
	Control Group #1	S_1 ⋮ S_n	S_1 ⋮ S_n
	Control Group #2		
Wheat Ridge (Jefferson County)	Experimental Group #1		
	Experimental Group #2		
	Control Group #1		
	Control Group #2		

*In order for a student's scores to be included in the analysis, he would have had to participate in both the pre- and posttest.

The analysis will be the same as designated in the project proposal for the Occupational Exploration Program (FY'74) with the exception that the sex variable has been deleted. Of key interest will be the interaction between the experimental-control variable and the pre and posttest variable. If the module has had an impact upon students, a significant interaction would be expected with the source of the interaction being a sizeable experimental group gain on the posttest. Separate analyses will be run for the total cognitive test scores as well as for two dimensions of the attitudinal scale. The analyses will be in accordance with the abbreviated summary table shown below.

Table 2 - Partial Anova Summary Table
For The Manufacturing Module

Source*		df	Potential F Test
Between Students		abcn-1	
Term No.	Between Classes	abc-1	
1	A	a-1	1/4
2	B	b-1	2/4
3	AB	(a-1)(b-1)	3/4
4	C/AB	ab (c-1)	4/5**
Within Classes		abc (n-1)	
5	E/C/AB	abc (n-1)	
Within Students		abcn (d-1)	
6	D	(d-1)	6/10
7	AD	(a-1)(d-1)	7/10
8	BD	(b-1)(d-1)	8/10
9	ABD	(a-1)(b-1)(d-1)	9/10
10	CD/AB	ab (c-1)(d-1)	10/11**
11	ED/C/AB	abc (d-1)(n-1)	
	Total	abcdn-1	

*A brief discussion of the variables will be included in the text immediately following this table.

**If the results from the two starred F tests yield insignificant F ratios, then the two terms 4 and 5, and 10 and 11, could be respectively pooled and used for the remainder of the appropriate F tests.

The independent variables for this module are described below:

Variable	Description	
A	Treatment (experimental vs. control)	Fixed; between levels of C
B	Schools (Denver vs. Jefferson County)	Fixed; between levels of C
C	Classrooms (n=8)	Random; nested within AB
D	Testing (Pre. vs. Post)	Fixed; within S's (repeated measure)
E	Students	Random; nested within ABC

D. Instrumentation - Instrument Specific

1. Knowledge Test - What Do You Know? (The test is appended to this report)

The knowledge test for manufacturing consisted of 35 questions. The test included 16 multiple choice questions and 19 matching type questions. In general, the questions were at a low comprehension level in relation to the Bloom Taxonomy. Three basic areas on thrusts were emphasized in the tests: process (10 questions); responsibility (10 questions); and environment/tools (15 questions).

An example of a process question is as follows:

Test Question #5

Which of the following things is manufactured?

a. Coal
b. Haircut
*c. Candy bar
d. None of the above

*Indicates correct answer

Process questions generally deal with understanding the steps involved in manufacturing a product, understanding what information might be necessary to perform a certain function, etc.

Responsibility questions are focussed on who or what group has responsibility for making decisions at a certain point in time, etc. An example of a responsibility question is given below.

Test Question #3

Which of the following assignments would be a major responsibility of the plant maintenance supervisor?

a. Scheduling production time
*b. Supplying tools
c. Analyzing defects in products
d. Planning new products

*Indicates correct answer

Environment/tools is a category of questions which deal with understanding the environment one works in, the types of tools that might be used in a job, the functions of tools, etc. An example of a question from this category is:

Test Question #4

In manufacturing production many different kinds of tools are used to perform various functions. Match the function with the tool needed to perform the function by placing the letter of the function by the tool. Place only one letter by each tool.

Function		Tool
a.	shaping	*b staple gun
b.	fastening	b glue gun
c.	cutting	c utility knife
d.	grinding	b screwdriver
		c scissors
		a box and pan brake
		b rivet gun
		c miter box saw
		c tin snips
		d sander
		b soldering gun
		c handsaw
		c squaring shear

*The letters in this column indicate the correct answers.

2. Affective Test - What Do You Like? (The test is appended to this report.)

The affective test was designed to measure attitudinal change on the part of the student. The first five questions consist of asking the student if he/she would like to try doing an activity. The student could respond in one of four ways to the item.

-Yes, I would like to try this
-No, I would not like to try this
-I'm uncertain about trying this
-I don't have enough information to know if I would like to try this.

The scale is scored so that the stronger the preference for trying to do an activity, the higher the score. Thus, yes and no responses receive the same scale value of 3, uncertain responses receive a 2 and not enough information types of responses receive a value of 1. These values are then summed and used in the analysis of variance described earlier. Summed scores can vary from zero (no response whatsoever) to 15. Note that the scale is scored so that strength of preference, rather than direction of preference is the important factor (i.e., yes and no responses while being in opposite directions, represent the same strength of preference and therefore receive the same score).

In addition to the scaled responses, students were encouraged to state reasons for their preferences. These reasons were classified and, in conjunction with the scaled responses, were coded and transferred to machine scorable forms. Checks were made on the scoring procedures to assure that the data was reasonably accurate, expecially with regard to the first five questions.

There were 13 other questions included in the What Do You Like? scale. The 5 questions following those just described were similar in nature to the earlier ones, but they required the student to supply or

fill in the type of activity that he preferred or did not prefer to do. Given the totally open-ended nature of this set of questions, it was difficult to develop an adequate and relatively exhaustive scoring scheme. In addition, given the state of development and the early trial nature of the pilot test, a decision was made to exclude results from these questions in the analysis of variance.

(The last 8 questions on the test were open-ended and asked the students about the experiences one should have before deciding on a job, the types of things that one should consider before taking a job, etc. The responses were classified and scored. Due to some difficulties in scoring these questions, results will not presented.)

3. Student Post Module Questionnaire - What Do You Think? (The questionnaire is appended to this report.)

This questionnaire was administered to students after they had completed the module and the module posttest. This instrument was administered only to the students who participated in the module. The content of the questionnaire relates directly to student preceptions of the module. The first twenty questions are in a scaled format. Questions in this set relate to a student's perception of the clarity of directions, the extent to which the module interested him/her, etc. For analysis and use, the results will be grouped and descriptively reported by the subject area to which they pertain. Other questions in the questionnaire deal with parts of the module the student liked best, parts he/she liked least, role(s) played in the simulation, etc. These questions will be descriptively summarized and included on the Reviser's Information Summary (RIS).

4. Teacher Evaluation Log (The log is appended to this report.)

The Teacher Evaluation Log consists of six instruments packaged in one booklet. The instrument order within the log parallels the ordering

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of the module. In other words, after students had completed the Introduction to Simulation, teachers would fill in the questionnaire regarding that part of the module. After students had completed the preview, teachers would fill in the questionnaire pertaining to the preview, and so on. Below is an instrument by instrument description of the six instruments contained in the log.

LISTING AND DESCRIPTIONS OF TEACHER EVALUATION LOG

No.	Questionnaire	General Description
I.	Introduction to Simulation	What materials were used; effectiveness in terms of student understanding and interest, technical quality, suggestions, etc.
II.	Module Preview	What materials were used, effectiveness in terms of student motivation, technical quality, etc.
III.	Preparation Phase	Similar to above questionnaires with the addition of questions regarding integration or fit with the rest of the module and questions pertaining to the role selection process.
IV.	Participation Phase	A questionnaire similar to a daily log wherein teachers primarily identified student and teacher problems in getting tasks done.
V.	Summary Phase	Questions relating to the summary in terms of its being a reasonable culminating activity, etc.
VI.	General Module Evaluation	Questions relating to the overall adequacy of materials, the sequencing of materials, module implementation, student participation and learning, etc.

5. Teacher Post Module Panel Review

After a module was completed, the teachers who had participated in the pilot test were convened to discuss the module. Per each individual section of a module teachers were asked about: the particular strengths of that section; the weaknesses; classroom solutions they used to overcome weaknesses; and what recommendations or suggested changes they had for revising the module. Emphasis during the review was placed upon probing into their perceptions of the module and looking for consensus among the teachers.

III. RESULTS

A. 1. Knowledge Test: Internal Consistency

Internal Consistency (K.R. #21)
By Total Groups and Testing Time
For Total 35 Item Test

TESTING TIME / GROUP	Pretest	N	Posttest	N
TOTAL EXPERIMENTAL GROUP	0.64	50	0.78	50
TOTAL CONTROL GROUP	0.81	37	0.75	37
TOTAL EXPERIMENTAL AND CONTROL GROUP	0.75	87	0.79	87

Interpretation/Comments

As clearly indicated in the table, the knowledge test for the manufacturing simulation is very reliable. The reliability coefficient for the posttest is slightly higher than that of the pretest. This would be expected both on the basis of experimental group growth in knowledge as well as the effect of the pretest on both experimental and control group understanding. The total test scores for this module can be interpreted with a relatively high degree of confidence.

A. 2. Knowledge Test: Validity

See Reliability Table for upward bounds or estimates of potential validity coefficients. (These would be equivalent to the square root of the reliability coefficients.)

Interpretation/Comments

Although no direct attempt was made to develop strategies or methods for determining validity, certain factors which would contribute to test validity should be kept in mind. First, care was taken in test development to eliminate items which were not career oriented. Items dealing with trivial detail were omitted. Secondly, three individuals reviewed the drafts and final version of the test. The test was considered to have reasonable face validity.

Other types of validity such as predictive, concurrent, construct, etc., were beyond the scope of this pilot test. For example, if a factor analytic study were attempted in order to determine construct validity, the values derived would be questionable with the sample size used in the pilot test. As a general rule of thumb, 200 cases are necessary for a factor analytic study. This is more than double the obtained sample size of 87.

A. 3. KNOWLEDGE TEST: TOTAL SCORE RESULTS

GROUP MEANS AND STANDARD ERRORS BY TOTAL GROUPS AND TESTING TIME FOR TOTAL 35 ITEM TEST

TESTING TIME / GROUP	PRETEST MEAN	PRETEST S.E.	PRETEST N	POSTTEST MEAN	POSTTEST S.E.	POSTTEST N
TOTAL EXPERIMENTAL GROUP	22.5	2.8	50	22.4	2.7	50
TOTAL CONTROL GROUP	20.2	2.8	37	19.1	2.8	37
TOTAL EXPERIMENTAL AND CONTROL GROUP	21.6	2.8	87	21.0	2.8	87

Interpretation/Comments

From this table several major facts emerge. First, the reliability estimates given earlier and the standard errors shown in this table suggest that the knowledge tests generally operated in a similar manner for all groups, exclusive of where the actual mean values fell. Secondly, there is apparently no change in the pre to posttest scores of the experimental group, and at the same time the control group realized a one point loss. The latter is probably a result of the control group "turning off" on taking the same test twice.

A. 4. KNOWLEDGE TEST: SUBTEST RESULTS

GROUP MEANS AND STANDARD DEVIATIONS BY TOTAL GROUP AND TESTING TIME FOR SUBTESTS

TESTING TIME		PRETEST			POSTTEST		
Group	SUB-TEST*	MEAN	S.D.	N	MEAN	S.D.	N
TOTAL EXPERIMENTAL GROUP	A	5.3	2.1	50	5.3	2.0	50
	B	5.6	1.9	50	5.8	2.2	50
	C	11.6	2.1	50	11.3	3.3	50
TOTAL CONTROL GROUP	A	5.1	2.1	37	4.6	1.8	37
	B	5.1	2.0	37	4.9	1.9	37
	C	10.1	3.7	37	9.6	3.7	37
TOTAL (EXPERIMENTAL AND CONTROL) GROUP	A	5.2	2.1	87	5.0	1.9	87
	B	5.4	2.0	87	5.4	2.1	87
	C	11.0	3.0	87	10.5	3.6	87

*SUBTEST A = 10 Process Questions
" B = 10 Responsibility Questions
" C = 15 Environment and Tools/Skills Questions

Interpretation/Comments

As is apparent in Table A.3. and as verified here, no appreciable differences are occuring in results from the pre to posttest. Subtest scores remain virtually unchanged.

Several conclusions may be drawn from this data:

1. The test, while reliable, is not adequately measuring the content of the module;
2. The module has no appreciable impact on student knowledge in this area;
3. Students were already knowledgeable about the content and the module impact was not of sufficient magnitude to increase this knowledge.

The reviser (and the evaluator) should note that the conclusions stated are but three of the many possible ones that could be drawn from this data. Care, therefore, should be taken before assigning an absolute value to a particular conclusion.

B. 1. Attitude Sale: Reliability

Inter Coder Percentage Agreement for Randomly Selected* Pre and Posttest Attitude Scales (Questions 1-5)

Testing Time	Percentage Agreement
Pre	88%
Post	92%

*n = 13 test booklets (6 from the pretest and 7 from the posttest) randomly selected from groups tested.

Interpretation/Comments

The figures in the table were devised by dividing the total number of disagreements in coding between two coders by the maximum number of responses coded. Very few differences between coders were observed.

Thus, reliability of the scoring for the attitude scale was achieved. (Reliability of the scale itself has not been measured in that the scale consisted of only 5 items. Reliability estimates of such a brief scale with a relatively small sample would not be too meaningful.)

B. 2. Attitude Scale: Validity

DATA

NOT

AVAILABLE

Interpretation/Comments

Data regarding the validity of the scale was not collected in the pilot test. The scale, however, was reviewed by staff members who were familiar with the content and goals of the module. Changes were made in accordance with comments they made about the scale. Thus a measure of face validity was achieved.

B. 3. Attitude Scale: Preferences

Means (Strength of Preference)* by Group and Testing Time for Questions 1-5

Group \ Testing Time	Pre	Post
Experimental	12.0	13.2
Control	11.5	11.5

*There were five questions each with a scale value of from zero (no response) to a strong preference value of 3 (yes or no). Hence the scale range is zero to 15 (5 x 3).

Interpretation/Comments

In terms of strength of preference, it is apparent from the table that the module did have an impact on the experimental group of students. On a relatively short scale (see footnote in the left hand column), the experimental group gained more than a full scale point. Several interpretations of these results are offered below:

- the module was able to influence student attitudes even though the students' basic knowledge of the field did not change;
- the scale with only 5 questions was sensitive enough to detect the change in attitude. (Also see the ANOVA for this set of data.)

In comparison, it should be noted that the control group did not change from the pretest to the posttest.

B. 4. Attitude Scale: Number of Reasons

Means (Number of Reasons)* by Group and Testing Time for Questions 1-5

Group \ Testing Time	Pre	Post
Experimental	2.1	1.2
Control	3.2	2.6

*Students were requested to state the reasons for their preference choice. The numbers in the table represent the mean number of reasons given for the first five questions for a group.

Interpretation/Comments

Several key facts are apparent in this table. They are:

-the control group stated more reasons to justify their choices than did the experimental group;

-the experimental and control groups both stated less reasons on the posttest than they did on the pretest;

-the drop in posttest response is roughly equivalent for the two groups and it is unlikely that an interaction effect will be observed. (See Table G. 2.)

There are several possible explanations that could be postulated for these results. For example, it is plausible that the complexity of the module and the vast number of forms decreased experimental group interest in stating posttest reasons. The control group may have simply "turned off" on taking the same test twice. Another explanation may be that the test form itself needs improvement and was inadequately measuring the impact of the module. Another explanation is that the module has very little or no impact on student reasons for their choices. The reviser should note that these are but a subset of the plausible explanations for the results.

B. 5. Attitude Scale: Type of Reasons

Type* of First Reason Given by Group and Testing Time for the First Five Questions

Group \ Testing Time		PRETEST		POSTTEST	
	Reason	Frequency	%**	Frequency	%**
Experimental	1	34	37.4	27	42.2
	2	2	2.2	4	6.3
	3	-	-	1	1.6
	4	26	28.6	12	18.8
	5	5	5.5	-	-
	6	6	6.6	4	6.3
	7	7	7.7	7	10.9
	8	3	3.3	5	7.8
	9	8	8.8	4	6.3
Control	1	41	39.8	41	47.1
	2	-	-	3	3.4
	3	-	-	-	-
	4	31	30.1	21	24.1
	5	2	1.9	4	4.6
	6	3	2.9	4	4.6
	7	20	19.4	9	10.3
	8	3	2.9	1	1.1
	9	3	2.9	4	4.6

Interpretation/Comments

Several factors are apparent from the table. First, although there is some shifting of response, it is difficult to interpret the change given the sizeable pre to posttest decrease in student willingness to provide reasons for their preferences. The decrease is approximately 29% for the experimental group and 16% for the control group. Secondly, while there is some pre-posttesting shifting of response in the experimental group it does tend to be paralleled by similar shifting in the control group. For example, note the shifts in reason categories one and four for the two groups, respectively. This comparison, however, does not hold for reason seven in the two groups.

These results are difficult to explain, especially in light of the decreased sample size. The authors of this report therefore cautiously conclude that the module either did not have a strong impact on student statements of reasons or that possibly the instrument was an insufficient means of measuring module impact.

B. 5. (Continued)

*Reasons were classified into nine basic types. These are:

1. liking or enjoying
2. past experience
3. financial reasons
4. interest/ability
5. learning new things
6. desire for responsibility
7. ignorance of job
8. undecided
9. other reasons

**Frequency in row divided by total frequency in respective column, multiplied by 100.

C. 1. Student Questionnaire: Reliability and Validity

DATA

NOT

AVAILABLE

Interpretations/Comments

The Student Questionnaire was administered to experimental group students after they had completed the module. Since there was only one test administration, the use of a test-retest coefficient was not possible. Furthermore the questionnaire consists of many different types of questions (including open-ended questions) regarding various aspects of the simulation experience. The meaning of internal consistency coefficients calculated for this type of instrument would be extremely questionable and hence they were not utilized.

Validity was basically ascertained by having the writers of the simulation review the instruments and by incorporating their comments and suggestions into the final form. In terms of face validity the instrument was judged to be a reasonable means of assessing the student's perspectives of the module. Secondly, comparisons between subsets of questionnaire items and achievement test data do tend to support the conclusion that the instrument is at least partially valid. As a group, students did well on the achievement tests and reported that the module did answer questions they had about jobs and did provide much information about jobs.

(Continued on next page)

Table C. 1 (Continued)

The reviser and evaluator should also keep in mind one other important fact about the student questionnaire. The questionnaire was not designed to evaluate students but as a means for students to provide the project staff with their opinions of the module as well as their suggestions for revision. Students were informed about the use of the questionnaire. It was hoped that their responses would be open and honest.

C. 2. Student Questionnaire: Results From Questions Dealing With Perceptions of Learning

Questions Dealing With Perceptions About Learning by Response Category in Frequencies and Row Percentages*

Question \ Response Category	Positive	Uncertain	Negative	No Answer
1. I learned quite a bit about jobs from the simulation.	21(46%)	13(28%)	10(22%)	2(4%)
2. I learned quite a bit about how to work with other people from the simulation.	21(46%)	13(28%)	10(22%)	2(4%)
7. The simulation helped to answer some of the questions I have about jobs.	20(43%)	10(22%)	15(33%)	1(2%)

*n = 46

Interpretation/Comments

Across the three questions there is a very consistent response pattern with 43-46% of the responses in the positive category (overall, 62 of the 138 possible responses or 45%) and 22-33% in the negative category (35 out of 138 or 25%). Although no clearcut majority emerged, there are many more positive responses than negative ones, indicating that a moderate number of students felt that the module provided them with information about jobs and about how to work with other people.

However, when compared to the responses to the same questions for the other simulation modules, it is clear that the manufacturing simulation had much less impact than the others on student perceptions about learning. (For example, see the evaluation reports for other modules tested during 1973-74.)

C. 3. Student Questionnaire: Results from Questions Dealing with Overall Perceptions of the Module

Questions Dealing with Overall Perceptions of the Module by Response Category, Frequencies and Row Percentages*

Questions	Positive**	Uncertain	Negative	No Answer
3. The simulation was Boring	15(33%)	15(33%)	14(30%)	2(4%)
4. Would Recommend Simulation to Friends	17(37%)	17(37%)	9(20%)	3(7%)
5. Would Like to go through more Simulations	20(43%)	13(28%)	13(28%)	-
6. Would rather do Something else with this Time	17(37%)	18(39%)	11(24%)	-
8. Simulation Took too Long	15(33%)	18(39%)	13(28%)	-

(Continued on next page)

Interpretation/Comments

Across these eight questions dealing with overall perceptions of the module, the responses were divided with no clear trends emerging. Out of the total possible responses (n = 368), 127 or 34% were positive, 109 or 30% were negative, and 128 or 35% were uncertain. This mixture of opinions indicates that the module did not have sufficient impact to change the responses from a generally random pattern. Comparing these results with those for the other simulation modules mentioned on the previous page, it is apparent that students' overall perceptions of the manufacturing production module were less positive as well as less definitive.

The highest percentages of positive reactions (37-43%) were expressed in regard to what seems to be the general concept of simulation (questions #4, 5, and 6) rather than to this particular simulation module.

Note that the wording on question 15 may have made it difficult for students to correctly identify how they wanted to respond to the question.

Table C. 3. (Continued)

Questions	Positive**	Uncertain	Negative	No Answer
9. Simulation was Over too Soon for Me.	9(20%)	17(37%)	21(46%)	-
12. Enjoyed working with Others	13(28%)	19(41%)	14(30%)	-
15. Simulation is a Good Way of Getting out of Class	21(46%)	11(24%)	14(30%)	-

*n = 46

**For questions with negative stems, disagreement with the stem constitutes a positive reaction to the module and is entered in the positive category on the table. This fact should be kept in mind when reviewing the table.

C. 4. Student Questionnaire: Results from Questions Dealing with Specific Module Parts

Questions Dealing with Specific Module Parts by Response Category in Frequencies and Row Percentages*

Question (Response Category)	Positive**	Uncertain	Negative	No Answer
10. Tasks too Complicated or Hard	22(48%)	16(35%)	8(17%)	-
11. Summary Helped Pull Things Together	12(26%)	16(35%)	18(39%)	-
13. Activities were Exciting To Me	13(28%)	15(33%)	18(39%)	-
14. Had Trouble Knowing What to do Next	20(43%)	10(22%)	16(35%)	-
16. Too Many Tests and Forms to Fill out	10(22%)	16(35%)	20(43%)	-

Interpretation/Comments

As noted in the previous table, the reactions to questions dealing with the module as a whole were rather divided; this is true of the reactions to specific module parts as well. Across the entire set of questions (with n=414 possible responses), 146 or 35% were positive, 130 or 31% were negative, and 135 or 33% were uncertain. Here again the responses are close to what would be expected of random answers although there is a shading toward the positive. The strongest positive reactions were on role selection and knowing what to do next. The most strongly negative reaction was that there were too many tests and forms to fill out (43%). Thirty-nine percent of the students responded negatively to statements that the activities were exciting and that the summary helped to pull things together.

It is possible to surmise that the structure and implementation of the module would need to be improved to elicit enthusiasm for specific module parts strong enough to carry over to a more positive student viewpoint on the module as a whole. For that reason, it would seem that the need for some simplification and improvement of the structure can be inferred from these results.

Table C. 4 (cont.)

	Positive**	Uncertain	Negative	No Answer
17. Pretest and Post-test were Difficult for Me	16(35%)	20(43%)	10(22%)	-
18. Simulation Parts Fit Together Well	16(35%)	16(35%)	13(28%)	1(2%)
19. Preview, Etc. Helped to Prepare Me for Simulation	14(30%)	16(35%)	15(33%)	1(2%)
20. Liked the Way I Selected My Role(s) in Simulation	23(50%)	10(22%)	12(26%)	1(2%)

*n=46

**For questions with negative stems, disagreement with the stem constitutes a positive reaction to the module and is entered in the positive category on the table. This fact should be kept in mind when reviewing the table.

C. 5. Student Questionnaire: Results from Other Important Questions

Other Important Questions by Response Category in Frequencies and Row Percentages*

Question \ Response Category	Yes, All of the Time	Yes, Most of the Time	No, Not Usually	No, Not At All	No Answer
22. Did You Perform Well in Your Roles?	12(26%)	22(48%)	6(13%)	-	6(13%)

Question \ Response Category	More Interested	No Change	Less Interested	No Answer
28. Did Your Feelings About Work in Manufacturing Production Change?	19(41%)	15(33%)	7(15%)	5(11%)

Question \ Response Category	Yes	No	No Answer
29. Did You Discover Any New Interests?	14(30%)	24(52%)	8(17%)

Interpretation/Comments

Students were positive about how they performed in their roles with 74% responding that they performed well at least most of the time. There was no one who answered that he did not perform at all well.

The results reveal a moderate positive change in students' feelings about work in manufacturing production with 41% of the students responding that they are now more interested in such work. There were 14 of the 46 students (30%) who discovered new interests.

C. 6 Student Questionnaire: Collated Open-Ended Responses to Questions #23, #25, #30, and #31.

#23. List a few reasons why you liked or did not like your role (or roles).

I liked them, fun, O.K., interesting (17).
They were easy (1).
There was too much time waiting between operations, took too long (2).
It was something I knew already (1).
It was boring (4).
The roles were fine but the people I worked with were always playing and trying to do other peoples jobs (1).

(No response=11)

#25. Describe the one thing which you feel you did best in the simulation and the one thing you did least well. Be sure to say why you did well or poorly.

Best Thing	Reasons
Gluing (4)	I put a lot of glue on; Because I wanted to; It was easy.
Sanding (2)	Because I liked it.
Box making (3)	It was fun; I did it well.
Metal layout (2)	It went along fast.
Single responses:	
Rivet	Don't know
Standing around	Nothing to do.
Hand driller	Went fast.
Everything	Easy
Screwing on legs	I liked it.
Inspect	
Free speaker	It's free
Put together wires & jacks	
Printer	Only fun thing.
Supervise	Far out.
Printing	It was fun.
Bending	None
Not sure (2)	

(No response = 23)

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#25. (continued)

Worst Thing	Reasons
None (10)	
Cut metal (2)	Needed help. I didn't cut straight all the time.
Single Responses:	
Electronics	Nothing worked.
Putting on contact	I didn't know how to well.
Drilling	Boring
Box	No
Test	Boring
Sheet Metal Layout Man	Boring
-	I just laid around

(No response = 23)

#30. Name some of the things you liked most about the simulation and some of the things you liked least about the simulation.

Liked Most

Speaker (10)
Gluing, glue gun (3)
Working with others, working with friends (2)
Inspecting (2)

Single responses:

The sanding
Working
Everything
It was fun
Putting it together
Boring
Box making
Box making
Bending the metal
Box printing
Put the paper on the metal

Liked Least

The work (3)
Paper work (2)

Nothing (7)

Single responses:

The whole thing; there was nothing to do!
The paper on it
Didn't get paid, no benefits; no lunch break
The way they ran the whole program
Inspecting
Everything
The solder

(No response = 24)

#31. Write down some of your ideas on how the simulation might be made better.

Change jobs everyday.
Solder guns
If they didn't make cartons.
I think it was good enough.
Better jigs
You can't make it better.
By putting better paper like cougar or lion designs.
Made a good cart - OK.
It was OK (2).

(No responses = 34)

D. 1. Teacher Log and General Module Evaluation: Reliability and Validity

DATA NOT AVAILABLE

Due to either lack of completion or to partial completion of the forms, data from the Teacher Logs and the General Module Evaluations is not available. To a degree, the questionnaires may not have been entirely compatible with the special nature of this module. All forms and comments that were collected were synthesized by Jeffco staff into the Panel Review Report.

Interpretation/Comments

The Teacher Log and General Module Evaluation is a set of six questionnaires to be completed by teachers as they observed students progressing through a module. The questionnaires varied considerably depending on the part of the module the teacher was to evaluate. Space was provided for teachers to supply comments about the materials and to make recommendations for change. The variable nature of the question content make it difficult to determine the reliability of the questionnaires. Further, even if a reliability coefficient could be calculated, the small sample size (n=4 experimental teachers) would render the coefficients meaningless.

Validity was determined by having product developers review the Teacher Log and General Module Evaluation. The developers considered the instrument to be a viable means of collecting teacher observations especially with regard to problems incurred in implementing the module.

E. 1. Teacher Post Module Panel Review: Reliability and Validity

DATA

NOT

AVAILABLE

Interpretation/Comments

The panel review procedure and reporting format was generated from similar efforts undertaken for the School Based Component of the Comprehensive Career Education Model (CCEM) in 1973. CCEM project staff felt that panel reviews provided an important source of data for revising curriculum materials. The process is purposely designed as an open-ended one to insure that teachers have the opportunity to freely discuss any concerns or comments they have about the module. Reliability in this instance is difficult to assess. It should be noted, however, that teachers were frequently asked during the review about the extent to which they agreed upon particular points. Thus, the panel report, in many cases, represents a convergence of teacher perspectives or opinions.

Validity is judged by the degree to which the revisers and evaluators will find the data collected from the panels useful for illuminating strengths and weaknesses within the module and helpful in determining revisions to be made in the module. Validity judgments will have to come sometime after the generation of this report.

Due to the open-ended nature of the panel review, Table III - E. 2 is simply a copy of the actual panel review. The report, which is a summary of the panel discussion, was written by OEP staff. For the Reviser's Information Summary (RIS) the main ideas of the panel review have been abstracted and placed in the appropriate cells of the RIS.

III. RESULTS*

E. 2. Teacher Post Module Panel Review

Reporting Form

Title of Module: Manufacturing Production
LEA: Jefferson County, Colorado and Denver, Colorado
Panel Leader: John Radloff
Panelists: James Sheeder - Denver
Robert Campbell, McKinley Turner - Jeff Co
Observer Participants: Maureen Anderson, Mary Harris - Jeff Co
James Fales - Texas A & M
Date(s) Panel Met: January 23 and 24, 1974
Number of Hours: (9 Hours Total) 3+ with panelists
6 Anderson - Fales - Harris

*Interpretation has not been provided.

TITLE	STRENGTH	WEAKNESSES	CLASSROOM SOLUTIONS	REVISION OR SUGGESTED CHANGES
Simulation	-Almost unanimous response that simulation was fun -Activities which were enjoyable received positive response -Most learned a lot from simulation -Most learned a lot about working with other people -Simulation was interesting to most -Most would recommend simulation to friends -Most would like to go through another simulation -Product had high motivational value	A few would have preferred doing something else during simulation (probably being in another situation)		-Eliminate all technical errors in slide/tape programs. These technical errors or failures frustrate teachers and students. These errors also add negative impact to simulation. Most of the tapes have poor beginnings (difficult to understand). In many tapes the speaking is too fast for comprehension. Technical failures include problems as slides sticking and not dropping or filmstrips not advancing causing them not to be in sequence with the tape.
Top Management's (Instructor's) Guide	-Helpful to all teachers	-Too much reading -Duplicity in way tasks described -Need to be easier to use and easier to locate information -Need clearer outline of what to do next	-Teacher tried not to allow students to be dependent upon them by encouraging workers to seek directions from supervisors	-Condense -Regroup resources; more positive identification of resources - especially in regard to quality -Eliminate confusion -Reduce dependency upon teacher -Put summary of simulation at beginning (perhaps in form of flow chart similar to education -Put words to tackle at beginning

TITLE	STRENGTH	WEAKNESSES	CLASSROOM SOLUTIONS	REVISION OR SUGGESTED CHANGES
				-Arrange handbooks chronologically -Consider different color rather than separate page introduction
Inservice Training of Teachers	-Valuable aid	-Frustration level of teachers high regarding equipment failures -Not totally aware of what has to be done	-Teachers agree that instructors would have to be thoroughly familiar with 1) portable drill, 2) drill press, 3) band saw, 4) sander and safety factors important in shop setting.	-Increase instruction of teachers regarding equipment failures -Look at evaluation sheet before starting unit -Emphasize that gauge length for certain operations may be wrong for their machines and may need to be lengthened or shortened. -Include instruction regarding equipment failures
PREVIEW Slide/Tape	-Helped most prepare for simulation	-Teachers and students thought it was too long -Educational quality and worth not rated high by teachers -Too much subject matter conveyed in too short a time and too briefly		-Divide into two parts: 1) Introduction to manufacturing production 2) Simulation experience -Relate roles to areas on interest form -Add more emphasis to line-staff organization -Put additional emphasis on cooperation (teamwork) in production -Teachers recommend having preview on different day than simulation
Preview Comic Book	-Most students used booklet	-Teachers' log gives low rating to booklet regarding its effectiveness for stimulating interest		-Evaluate whether (how) to make illustrated booklet more effective for simulating student interest.

TITLE	STRENGTHS	WEAKNESSES	CLASSROOM SOLUTIONS	REVISION OR SUGGESTED CHANGES
PARTICIPATION Manufacturing Production (slide/tape)	-Good information	-Poor retention -students and teachers felt present slide/tape show too long -Some students thought Peter and Polly were dumb and immature--some would prefer a more straight approach--some thought the use of these characters made students take project less seriously		-Divide into two parts: 1) Division of manufacturing production ..add slides with explanation and illustration of jobs in each category ..include information on job application and preference chart 2) Safety -Put safety information close to actual production -Allow possibility of showing safety precautions twice to non-technical arts students -Need more emphasis on caution necessary in using glue guns -Evaluate statements of Peter and Polly; revise any that seem too corny
PARTICIPATION Flow Chart (slide/tape)		-Poor beginning -Student comprehension low -Words of speaking text run together -Confusion in where-when students apply for job	-In one class teacher gave three extra tests regarding safety and use of 1) band saw, 2) drill press, and 3) other power equipment -One teacher read through safety booklet with class -Students in all classes had already received instruction in safety and passed tests regarding safe use of shop equipment	-Improve for better understanding and comprehension -Eliminate confusion and establish better direction -New time sequence may influence this presentation

TITLE	STRENGTHS	WEAKNESSES	CLASSROOM SOLUTIONS	REVISED OR SUGGESTED CHANGES
Poster - Tape Series	-Good change of pace and offering in activity	-Speaking is too fast		-Add poster with list of qualifications of plant superintendent for class to read when same information is on tape
Manuals* Plant Superintendent Production Supervisor Quality Control Supervisor Maintenance Supervisor Production Coordinator	-Role important and valuable experience for student	-Students complain of too much reading -Poor comprehension; according to teachers material not not consistent with students' maturation level -Difficult for some students to read -Concepts not understood -Students felt they only needed to use operation sheets -Manuals not presently used by students -All teachers agreed there wasn't enough time for training of supervisors at beginning of unit -Supervisors need more confidence to have a student directed activity -Need to improve communication between supervisors and workers -If trained supervisor moves away or leaves school, under present system no one else is trained to take over his job -Teachers agree that students did not use booklet "What Job Would I Like" -Present role gives person feeling of not being needed (maintenance supervisor)	-Each teacher worked with supervisors for at least one class period -Supervisors that had consistent attendance did best job -Students not working at beginning used talking pages and film-o-sound; if interested in some other job the student viewed that operation sheet -Maintenance supervisor in one class got fixtures out	-Manuals need to be condensed eliminate duplicity -Check readability level of information downgrade vocabulary, use simpler sentence structure, use some italics or offer change in visual format (help students see main points and make it easier for review and/or reference) -Give supervisors additional planning time at beginning -Change time sequence -Redesign sequence of supervisory training, initial choice between 1) fabrication and assembly and 2) quality control -Involve entire class in supervisory training for greater understanding of entire production and roles -Improve worker's responsibility to supervisors -During supervisory training have production planning -After training discern which individuals want which supervisory positions -Develop procedure for selecting supervisors and plant superintendent.

*Comments applicable to all information not just manuals.

TITLE	STRENGTHS	WEAKNESSES	CLASSROOM SOLUTIONS	REVISION OR SUGGESTED CHANGES
		-Students goof off and interfere during activity -Present choice system allows person to select supervisor as #1 choice and maintenance as #5 choice and become a maintenance supervisor. . . yet person who selects maintenance as #1 choice may never get to do any maintenance work		-Develop filmstrips or other audio-visual information for use during the supervisory training -Revise getting into roles -Reduce importance of maintenance supervisor with main responsibility being care of equipment -Improve directions for hiring instructors and role selection
Production		-Too difficult to use without extensive teacher help -Kids couldn't follow calculation sheet	-Teachers worked through books with students or completed problems themselves	-Revise and simplify or -Eliminate altogether and tell students the sequence of operations or -If all students take supervisory training (one of the revision suggestions) then develop into a more comprehensive activity
Operation Sheets and Operations per se	-Most thought these were excellent -Film-o-sounds, talking pages and operation sheets helpful facilitating student self-direction	-Many felt these were all they had to read or use -Many students cannot use sub-miniature jac -Students did not like some paper coverings -Directions not clear -Poor quality solder--teacher and student response also indicate need for different soldering iron	-Students used operation sheets and company file but not company handbook -Some teachers actually did wire-cutting, stripped ends of wires, and soldered wires to jacs	-Improve organization by not using operation sheets until after supervisors' meeting and company name is selected: this could result in another session -Use miniature jac; or perhaps give student choice of miniature or sub-miniature jac; eliminate confusion (reverse operation sheet)

TITLE	STRENGTHS	WEAKNESSES	CLASSROOM SOLUTIONS	REVISION OR SUGGESTED CHANGES
				-Have variety of coverings available for speaker; make certain coverings are sticky enough to adhere -Improve instructions on: bending the sheet metal, improve directions, possibly add demonstration on attaching paper to metal -Select better quality solder and different soldering iron -Improve production flow -Need to test functioning of sound earlier
	-Some jigs and fixtures need slight revision			-Find solution to paint coming off of sanding jig and then not able to get off legs -One teacher recommended that for each operation there be an example of that operation (or step) already done
Company Rules		-Not used		-Consider eliminating
Terms to Tackle	-Good response from teachers			-Put at front of teacher's handbook
Working Drawing	-Good teacher and student response			
Charts Organization Production Flow Preference	-Too much printed information -Confusion among students regarding role selection			-Perhaps replace by a flow chart which combines information and thereby reduces number of printed sheets handed out -Revise getting into roles

TITLE	STRENGTHS	WEAKNESSES	CLASSROOM SOLUTIONS	REVISION SUGGESTED CHANGE
Descriptions				-Use two descriptions 1) fa rication, 2) assembly and quality control
Files		-Some material added before use		-Add information only prior to immediate use
Employee Forms		-Students overwhelmed with printed work (unanimous) -Often not fill out forms which had negative influence on production control	-One teacher had to read interest form to class	-Put directions on forms (interest, scoring, prefer ence) rather than in separ ate booklet -Add a reference point for scoring of scoring sheet -Give forms out only immedi ately prior to use-- in- cludes not handing out com pany handbook contents and company file contents unti they are going to be used
Supervisor's Forms		-Students complain and become overwhelmed and bored with amount of paper work		-Combine (thus reduce) numb of forms and simplify -On worker assignment sheet assign as many kids as pos ble to first job that take longest
Pre/Post Tests		-Negative teacher and student response to number of forms and length of forms -Divided opinion among students whether summary is helpful -Considerable overlap of ques- tions -Several felt pre-test and post-test too difficult -Many of same kinds of ques- tions asked in Summary		-Reduce number of forms and length of forms -Downgrade vocabulary -Should not detract enthusi from finished product -When comments are not soug list in horizontal form (linear form increases length of questionnaire)

F. Knowledge Test: Analysis of Variance for Total Test Scores

Summary Table*

Source	df	SS	Ms	F
Between Subjects	86			
Between Classes	7			
A	1	197.26	197.26	4.08
B	1	271.12	271.12	5.60
AB	1	86.65	86.65	1.79
C/AB	4	193.59	48.40	1.05
Within Classes	79			
Subjects E/C/AB	79	3657.17	46.29	
Within Subjects	87			
D	1	32.07	32.07	1.20
AD	1	1.85	1.85	.07
BD	1	50.67	50.67	1.90
ABD	1	51.31	51.31	1.92
CD/AB	4	106.76	26.69	2.22
ED/C/AB	79	949.19	12.02	
Total	173	5597.64		

*Where A=Treatment (experimental vs control)
B=Schools (Denver vs Jeffco)
C=Classrooms (n=8)
D=Testing (Pre vs Post)
E=Students

**$p < .05$

Interpretation/Comments

As described earlier in the text of this report the key term to be observed in the analysis is the AD interaction. If AD interaction occurs and it occurs in such a manner that the experimental group shows high posttest gains, then most likely the module had an impact on student career knowledge in this particular field. As noted in A. 3 and A. 4, the interaction did not take place. Indeed, when mean scores are studied it is clear that the experimental group did not change from the pre to the posttest and the control group score actually decreased. (This latter occurence is probably due to a lack of interest in taking the test a second time.) Table F. indicates that the interaction term is not statistically significant.

G. 1. Attitude Scale: Analysis of Variance For Strength of Preference Scores (Questions 1-5)

SUMMARY TABLE*

SOURCE	df	SS	MS	F
Between Subjects	87			
Between Classes	7			
A	1	51.5	51.5	1.5
B	1	21.6	21.6	.6
AB	1	11.6	11.6	.3
C/AB	4	134.0	33.5	3.4**
Within Classes	80			
E/C/AB	80	784.8	9.8	-
Within Subjects	88			
D	1	15.3	15.3	7.3
AD	1	15.9	15.9	7.6
BD	1	42.9	4.3	2.0
ABD	1	8.3	8.3	4.0
CD/AB	4	8.4	2.1	0.5
ED/C/AB	80	334.0	4.2	
TOTAL	175	1428.3		

*See footenotes in Table F.
**$p \leq .01$

Interpretation/Comments

An examination of Table G. 1 reveals that while no significant AD interaction was achieved, the F ratio actually obtained is large in view of the respective degrees of freedom for this specific F test. This factor in conjunction with other additional data collected for the manufacturing production module tends to suggest the following conclusions:

- the module was having a fairly large impact on student attitudes;

- the limited time allotted for testing and the trial nature of the attitude scale may have precluded the complete measurement of the attitudinal effect.

Note that the above conclusions are several from the many that could have been posited. Other interpretations are plausible and should be considered by the reviser and/or reviewer.

G. 2. Attitude Scale: Analysis of Variance for Number of Reasons

SUMMARY TABLE*

SOURCE	df	SS	MS	F
Between Subjects	87			
Between Classes	7			
A	1	62.3	62.3	7.6
B	1	0.6	0.6	.1
AB	1	2.7	2.7	.3
C/AB	4	32.9	8.2	1.3
Within Classes	80			
E/C/AB	80	489.4	6.1	-
Within Subjects	88			
D	1	17.5	17.5	1.2
AD	1	.5	.5	.0
BD	1	9.7	9.7	.7
ABD	1	12.3	12.3	.9
CD/AB	4	58.0	14.5	4.2**
ED/C/AB	80	274.3	3.4	-
TOTAL	165	960.2		

*See footnotes in Table F.
**$p \leq .01$

Interpretation/Comments

As described earlier in the text of this report the key term to be observed in the analysis is the AD interaction. If AD interaction occurs in such a manner that the experimental group shows high posttest gains, then most likely the module had an impact on the number of reasons students gave for supporting a preference.

Results in Tables B. 4, presented previously in this report, indicate that the module was not having an impact on the number of reasons given. In this table, G. 2, the AD interaction that did occur was obviously not of sufficient magnitude to produce a statistically significant result.

IV. Reviser's Information Summary (RIS)

A. Description of the Summary

The Reviser's Information Summary was developed for the purpose of assisting revisers to assimilate information collected during the pilot test of a module. To accomplish this, information from each source available was first reviewed and then only major thrusts or ideas from the source were summarized. (These key thrusts or ideas were determined by the judgment of the authors of this evaluation report.) The summary was then transferred to the appropriate location on the large sheets which constitute the RIS. Lastly, each column was studied and trends were drawn and so recorded at the bottom of the sheet. In ascertaining the trends the authors used their familiarity with data, the module, and the data collected.

In general there will be one Reviser's Information Summary sheet per part of the module and one-two sheets covering the overall nature of the module. On sheets which pertain to module parts, only some of the data sources provided information pertinent to that part. Hence, the sheets do have some blanks or missing data cells. The reviser should exercise extreme care in interpreting the information on the sheets and should always keep in mind that comments on the sheets represent only a summary of key points. In addition, it sometimes was most difficult to determine a trend in the information obtained.

B. Use of the RIS

One way the reviser might use the RIS is as follows:

1. Read the module -- become thoroughly familiar with it;

2. Read the first part of this report (Section I and II) thoroughly. Skim the results compiled in tables (Section III, parts A, B, C, D, and E.) Read Section E-2, the teacher panel review report closely;

3. Read and study the Reviser's Information Summary. (Consult original data sources, if necessary.); and

4. Generate a set of revision specifications based upon knowledge of the module, the Reviser's Summary, project developmental criteria and other information, if appropriate.

C. REVISER'S INFORMATION

SUMMARY

Manufacturing: Overall Consi

	STRENGTHS	WEAKNESSES
STUDENT QUESTIONNAIRES	The students responded favorably that the module helped them to learn about jobs and how to work with other people (46%) and answered job questions (43%). Forty-three percent of the students would like to do another module. (However in each case these percentages leave a majority of the students reacting with uncertainty or negatively.) When asked to list reasons why they liked their role(s), seventeen of the forty-six students responded that the roles were liked, were fun, O.K., or interesting. See individual listing for positive open-ended responses.	Student responses to questions dealing module and specific module parts were In no case did a majority of the stude The greatest number of negative respon too many tests and forms to fill out. See individual listing for negative op
TEACHER PANEL *	1. There was almost unanimous response that the simulation was fun, interesting, and contained some enjoyable activities resulting in high motivational value. 2. Most of the participants learned a lot from the simulation including how to work with other people. 3. Most would like to go through another simulation and would recommend it to friends.	1. Technical errors in slide/tape pro and students and added negative im 2. A few students would have preferre 3. There is considerable confusion a is expected. 4. The unit is too difficult for some concepts are not understood. Teac consistent with the maturation lev 5. Both teachers and students complai too much to read. Students tended and not the manuals. 6. The forms are too long and numerou were not even used. 7. There is extensive overlap of mate other evaluation instruments, and 8. The directions need increased clar 9. The simulation is perhaps trying t 10. Many of the students felt that the dumb and immature. Some students were beneath the grade level and m school student, that they made stu seriously and treat it as a game, forward approach would be preferab 11. Several felt that the pretest and and detracted enthusiasm from the

*It is unclear as to whether teachers or students gave the above responses. from the teacher evaluations, student questionnaires, student interviews, an Since the data was comingled in this manner, it is difficult to determine fr when reviewing the panel results inasmuch as they contain data from several collected for this module.

erations (1)	RECOMMENDATIONS FOR REVISION
ith perceptions about the ry divided in nature. s agree on a response. s indicates that there were -ended responses.	
ams frustrated teachers ct to simulation. doing something else. ut what to do next and what tudents to read and many rs find that it is not of the students. d vehemently that there is o read the operation sheets therefore, many forms al in the pretest, posttest, mmary. y. cover too much material. olly-Peter characters were lt that the characters urity of the junior high nts take the project less d that a more straight- . sttest were too difficult tal product.	1. Eliminate technical errors in slide/tape programs: beginning of tapes difficult to understand, speaking too fast for comprehension, slides and filmstrips often failed to advance properly. Include provision for equipment failures. 2. Arrange the handbooks chronologically. 3. Consider having introductions be of a different color rather than a separate page. 4. Arrange the handbooks in chronological order and provide an index (or outline or table of contents) as well as a glossary at the beginning. 5. Use simpler sentence structure and highlight main points with italics or bold print for easy review and for reference. 6. Reduce the amount of printed material distributed. For example, directions could be printed on all forms rather than in a separate booklet. 7. Reduce the amount of reading required and shorten the forms. 8. Consider whether charts should be retained as they are, confusing, and the directions for their use need clarifying. 9. Consider the question of whether manufacturing constitutes a cluster and this simulation a portion of it, production and production supervision. Other cluster segments might be sales and distribution, research and development, production planning, and administration. 10. Evaluate use of Polly-Peter characters. 11. Re: pretest and posttest, downgrade vocabulary, and reduce number and length of forms.

this module all information obtained from teachers was synthesized in Jeffco
interviews with the project developer and editor. (Also see Table D. 1.)
which source specific comments are drawn. Care should therefore be exercised
rces. Also, it should be noted by the reviser that no Teacher Logs were

Manufacturing: Overall Cor

DATA SOURCE	STRENGTHS	WEAKNESSE
STUDENT TESTS	The strength that emerged from the pre- and posttesting is that there is some shifting of student attitudes as measured by strength of preferences. Students, who experienced the module, did have stronger posttest preferences than those who did not, although these results did not reach a point of statistical significance. (Also see comments in weaknesses column.)	With regard to cognitive achieveme of students showed virtualy no cha to either lack of module impact or somewhat high pretest scores were rence would tend to make it diffic already high set of scores. With actually stated fewer reasons to posttest than they did on the pret reasons did not change to any gre response pattern of students in th
TEACHER LOGS	Logs were not collected for this module.	
TRENDS	1. With regard to data collected from student questionnaires, 40% or more of the students responded that the module helped them to learn about jobs. While that is not a majority, it does not indicate that the module does have the potential for providing occupational information to students. 2. This is corroborated by data from the panel which indicates that the module does have some interesting and enjoyable activities. Also, student attitudes, as judged by strength of preference, did change. 3. Note: The above two points may be more indicative of the potential of the module rather than existing strengths. This observation is prompted by the large number of problems that occurred in the implementation of this module as well as by the fact that many of the participants did not positively respond to the module.	1. With regard to many of the que "What Do You Think?" questionn quite divided. The module was 50% positive response to any q 2. Students did not increase thei simulated. (This may be a par level of pretest scores achiev 3. While strength of preferences reasons supporting preferences phenomenon could be a result o associated with the module. 4. There are extensive problems r the module. A sampling of the below. - Excessive forms - Confusion with regard - Excessive amounts of - In some instances, co - Scope of simulation m - Technical errors in s - Also see other weakne

iderations (2)	RECOMMENDATIONS FOR REVISION
nt the experimental group nge. This may be attributed perhaps to the fact that achieved. This latter occur- ult to show an increase in an regard to attitude, students ustify their preferences on the est. Moreover the types of t degree when compared to the e control group.	
tions contained in the ire, students responses were not able to command even a estion. knowledge of the area ial function of the high d.) id change, the number of dropped considerably. This having too many forms lated to the implementation of set of problems is listed to directions eading cept difficulty y be too large ide/tape programs ses noted throughout the RIS.	Both in the column above and throughout the specific RIS sheets many recommendations for revision are given. In this space no attempt will be made to pull together all of the recommendations, however, several major threads will be described. - Reconsider the structure of the simulation with a view toward greatly streamlining it. - Improve the directions in the simulation and carefully review the vocabulary with regard to difficulty level. Simplify sentence structure. - Reduce amounting of reading, shorten and/or eliminate many of the forms. - Review the conceptualization of the material presented in the simulation. For example is the detailed planning phase appropriate for the maturational level of the students? - Also see other recommendations noted throughout the RIS.

Manufacturing: Intro

DATA SOURCE	STRENGTHS	WEAKNESSES
STUDENT TESTS	———	———
STUDENT QUESTIONNAIRES	From an incremental test done in the Fall of 1973*the following results were obtained: 87% (n=15) or more of students using the materials felt that they understood the materials and that the vocabulary was easy to understand.	When students were questioned wit enjoyment with the introduction, etc. the picture became somewhat -Only 53% of the students were of enjoying the booklet or the -About 1/3 of the students were of liking the illustrations.
TEACHER LOGS	———	———
TEACHER PANELS	———	———
TRENDS	See above column	See above column

*Test data was collected from students in Upper Arlington, Ohio.

uction to Simulation	RECOMMENDATIONS FOR REVISION
———	———
regard to their overall he quality of the materials, ore mixed in nature. irm in their statement slides strongly positive in terms	-Slightly over one-half of the students recommended that the slides and booklet be used together, with the slides coming first.
	———
—	The teachers recommended doing the Introduction to Simulation and Preview on different days.
	See above column

Manufacturing: Prev

DATA SOURCE	STRENGTHS	WEAKNESSES
STUDENT TESTS	———	———
STUDENT QUESTIONNAIRES	———	There was mixed response to the questic helped to prepare the students for the answering positively, 35% uncertain, ar
TEACHER LOGS	———	———
TEACHER PANEL	Most students used both the slide/tape and comic book.	1. Teacher panels indicate a low ratir effectiveness for stimulating inter Evaluator's note: Perhaps this wa negative reaction to the Polly-Pet 2. Both teachers and students felt th long. 3. Teachers did not give the educatio slide/tape a high rating. They fe matter was covered in too short a
TRENDS	Surprisingly, in this instance, no particular strengths were identified by either teachers or students.	A mixed student response and low rati preview apparently stemmed from sever 1. The comic book didn't stimulat due to the Polly-Peter charact far below the maturational lev 2. The slide/tape was too long an subject matter.

ew	RECOMMENDATIONS FOR REVISION
	———
n of whether the preview imulation with 30% 33% negatively.	———
	———
g for the comic book's est. partially due to the r characters. t the slide/tape was too al quality and worth of the t that too much subject ime and too briefly.	1. Evaluate how to make comic book stimulate student interest. 2. Have the preview on a different day than introduction to simulation. 3. Divide the slide/tape into two sections, one an introduction to manufacturing production, the other on simulation. 4. Place more emphasis on teamwork in production and line-staff organization. 5. Relate roles to areas on interest form. 6. Use the booklet first, then slides.
g of the teachers for the l factors: student interest, possibly rs which may have been too l of the students involved. tried to cover too much	Teachers' suggestions for revision as given above should be studied as a means of strengthening the preview. Of special importance is the need to present the Introduction to Simulation and the Preview on different days.

Manufacturing: Preparat

DATA SOURCE	STRENGTHS	WEAKNESSES
STUDENT TESTS	———	———
STUDENT QUESTIONNAIRES	Role selection got the most positive response given by the students to any questionnaire item with 50% answering that they liked the way they selected their role(s) in the simulation.	References to too many forms to fil least partially directed at the pre
TEACHER LOGS	———	———
TEACHER PANEL	1. Good information on the slide/tape "Manufacturing Production".	1. Poor retention of information on sl 2. Students and teachers felt that the long. 3. Teachers agree that students did no Job Would I Like?" 4. Present choice system allows perso #1 choice and maintenance as #5 cho supervisor; yet person who selects may never get to do any maintenance 5. Confusion among students regarding
TRENDS	Information delivery about roles from the slide/tape evidently resulted in a positive student reaction to the role selection, although there are some reservations as noted in the next column.	The teachers commented on some confusio role selection, possibly due to poor re information. This could have been caus of the slide/tape. This mention combin there were too many forms to fill out a make use of the booklet indicates that not used in a balanced way to allow for by a variety of materials.

	RECOMMENDATIONS FOR REVISION
out may have been at paration section.	
ide/tape. slide/tape show was too use the booklet "What to select supervisor as ice and become a maintenance aintenance as #1 choice work. role selection.	1. Divide the slide/tape into two parts: Manufacturing production (explanation and illustration of jobs in each category, information on job application and preference chart), and safety. 2. The safety portion should be closer to actual production and mig be shown twice to non-technical arts students. Additional emphasis is needed on caution necessary in using glue guns. Teachers dealt with safety instruction according to class background. 3. Evaluate statements of Peter and Polly and revise any that seem too "corny". 4. Revise getting into roles. 5. Improve directions for role selection.
among students regarding ention of the slide/tape d by the excessive length d with comments that d that the students did not erhaps the class time was information reinforcement	Teachers suggested some revision with improved directions for role selection. The slide/tape might be divided up with one part providing additional emphasis on safety.

DATA SOURCE	STRENGTHS	WEAKNESSES
TEACHER PANEL	1. The roles written into the manuals for Production Supervisor, Production Coordinator, Quality Control Supervisor, and Maintenance Supervisor provide important and valuable experiences for the student. 2. Most thought that the operation sheets and operations per se were excellent. The filmosounds, talking pages and operation sheets were helpful in facilitating student self-direction. 3. The "terms to tackle" got good response from teachers. 4. The working drawings got good response from both students and teachers. 5. The tape and posters on "Electing a Plant Superintendent" were a good change of pace in activity. Evaluator's Note: The filmosound cartridges used for this module will not fit on the new model of the machine.	1. The speaking on the tape "Elect too fast. 2. Because of difficulties with co ing as noted in the comments fo (and possibly forms) were not u students felt the operation she 3. Teacher and student comments in visors to have more time for st together, and developing skills other and with the workers. (P this process). This would impr vision, and workers' responsibi visors lacked confidence becaus 4. In absence of Production Superv take over his job. 5. Students "goofed off" and inter 6. Maintenance supervisor did not 7. The slide/tape on the flow char words of the speaking text run about where and when students a low student comprehension. 8. The production schedule guidebo out extensive teacher help. Th calculation sheet. 9. The directions on the operation 10. There were specific difficultie a) The solder was of poor quali response also indicates a ne b) The students did not like th coverings and some were not c) Many students cannot use a s or tape player. d) Paint comes off the sanding come off. 11. The Company Rules list was not 12. There was unanimous agreement with printed work and would of and supervisor forms. This ha control. 13. There are times (at start of pr have nothing to do.

ticipation (1)

ng a Plant Superintendent" is

prehension and amount of read-
the overall unit, the manuals
ed by the students. The
ts were sufficient.
icate great need for the super-
dy of their roles, planning
for communicating with each
ssibly the workers could observe
ve the production process super-
ity to the supervisors. Super-
of insufficient time.
sor, no one else is trained to

fered with the activities.
feel needed.
had a poor beginning and the
ogether. There was confusion
pply for a job and generally

k was too difficult to use with-
students couldn't follow the

sheets were not clear.
with some of the resources--
y, and teacher and student
d for a different soldering iron.
pattern of some of the paper
sticky enough to adhere well.
bminiature jac with their radio

jigs, gets on the legs, and won't

used.
hat the students were overwhelmed
en not fill out the employee
a negative effect on production

duction) when some workers

RECOMMENDATIONS FOR REVISION

1. Slow the speaking rate on the tape "Electing a Plant Superintendent".
2. Add a poster to the tape/poster series with a list of plant superintendent qualifications for the class to read while they hear it on tape.
3. Condense manuals, revise reading level, and remove duplicative information.
4. Expand the time sequence to allow the supervisors to have more time for planning and training. Perhaps the entire class could be involved in the supervisory training for greater understanding of the entire production process and other roles. Then after that time, discern which individuals want supervisory positions and develop a procedure for selecting supervisors and plant superintendent. Or there could be production planning during the supervisory training.
5. Improve workers' responsibility to the supervisors.
6. Redesign sequence of supervisor's training to choice between a) fabrication and b) assembly and quality control and use these two descriptions throughout.
7. Develop audiovisuals for use during the supervisory training.
8. Revise the role selection procedure and improve the directions.
9. Reduce the importance of the maintenance supervisor's role, perhaps to inspector rank, with care of equipment as primary responsibility.
10. The production schedule guidebook should be revised and simplified. If all students take supervisory training, it could be developed into a more comprehensive activity. Otherwise it might be possible to eliminate it altogether and tell students the sequence of operations.
11. Reduce the amount of written material given out and improve the distribution so that information is given only immediately prior to use (such as company handbook and file contents). The operation sheets should not be used until after the company meeting in the first session (which might necessitate an additional session).
12. Correct the difficulties with the resources:
    a) Select better quality solder and different soldering iron
    b) Have variety of coverings available for speaker; make certain coverings will adhere.
    c) Use a miniature jac or give students a choice of miniature or sub-miniature.
    d) Find solution to paint coming off of sanding jig.
    e) Improve instructions on bending sheet metal.
13. Improve production flow.
14. Test functioning of sound ahead of time.
15. One teacher recommended that there be an example of each operation already completed.
16. Consider eliminating the company rules list.
17. Perhaps some of the charts could be replaced by a flow chart which combines information and thereby reduces the number of printed sheets handed out.
18. Put directions on forms rather than in separate booklet and combine and simplify forms.
19. Add a reference point to score scoring sheet.
20. On worker assignment sheets assign as many students a possible to first job that takes the longest time.

DATA SOURCE	STRENGTHS	Manufacturing: WEAKN
STUDENT TESTS	———	———
STUDENT QUESTIONNAIRES	A moderate number of students felt that the tasks were not too complicated or hard (22 or 48%), while 20 (43%) did not have trouble knowing what to do next.	Few students reacted enthusiastic the simulation being exciting; of answered positively, 15 (33%) unc negatively. Corroborating this r module boring, while 15 (33%) dis 15 (33%) were uncertain.
TEACHER LOGS	———	———
TRENDS	Teachers pointed out that the role activities were excellent, providing important and valuable experiences for students. The materials used and the variety provided got good response. However, while some students found that progressing through the module was no problem, the overall feeling was that there were a great number of specific implementation difficulties as noted under weaknesses.	The major weaknesses reported fall 1. An excessive amount of printed students and had negative impa result, several pieces of mate employee and supervisor forms, even the manuals. It appears only operation sheets, the pro the slide/tape. 2. There were difficulties in con materials and the slide/tape. difficult to use without exter speaking on the slide/tapes wa 3. There were specific difficulti as noted by the teachers above 4. The student attitude toward th hoped for, with significant per the module boring or at least ties in with the teachers' con when some workers had nothing tended to "goof off" and inter that the maintenance supervis 5. The supervisors were unable to complete success, perhaps bec study, plan, and develop skill workers. 6. The production schedule guideb may be above the maturational 7. There apparently were far too 8. Given the large number of re there are many implementation phase.

Participation (2) SSES	RECOMMENDATIONS FOR REVISION
lly about the activities of the 46 students, 13(28%) rtain, and 18 (39%) sponse, 14 (30%) found the greed with them and another	
into the following areas: material overwhelmed the t on the simulation. As a ial went unused such as the the company rules list, and hat the students got by with uction schedule guidebook, and rehension with both reading The reading materials were too ive teacher help, and the too fast and run together. s with some of the resources module was not as would be entages of students finding ot exciting. This reaction ents that there were times o do, that the students ere with the activities, and felt unneeded. carry out their roles with se they needed more time to for communicating with the ok as presently constructed evel of the students. any printed forms to complete. ommendations it is clear that roblems in the participation	1. The reading materials must be condensed and simplified and the number of forms must be reduced. 2. The slide/tapes should be reworked to be comprehensible. 3. Difficulties with the resources should be attended to. 4. A method should be sought to improve the relationship of the supervisors and the workers and to bolster the overall student attitude toward the simulation. Specific suggestions as given in the other sections of this column by the teachers should be considered carefully with a view toward streamlining the module. Improving the implementation of the module may greatly enhance its effectiveness.

DATA SOURCE	STRENGTHS	Manufacturing: Sum WEAKNESSES
STUDENT TESTS	———	———
STUDENT QUESTIONNAIRES	———	Twenty-six percent of the students fel pull things together, with 35% uncerta that it did not.
TEACHER LOGS	———	———
TEACHER PANEL	———	Teachers and students have a very neg number of forms. In its present form the enthusiasm over the finished proc may detract in any form.
TRENDS	There were no strong points of the summary that were noted.	Both the teachers and a substantial n the use of the summary did not achiev for and that it detracted from the si

nary	RECOMMENDATIONS FOR REVISION
	———
t that the summary helped in and 39% responding	———
———	———
tive response to the , the summary detracts from ct, though in reality it	Attempts should be made to improve the integration and worth of the summary. The number of forms to fill out needs to be reduced.
mber of students felt that the purpose it was intended ulation as a whole.	It is apparent that the summary will need extensive reworking to be a contributory element of the simulation. Care should be taken in the process to keep the number of forms to a nimimum. (It may be that the summary seems anticlimatic especially in light of the fact that the students already have completed the speakers.)

Manufacturing

DATA SOURCE	STRENGTHS	WEAKNESSES
STUDENT TESTS		
STUDENT QUESTIONNAIRES		
TEACHER LOGS		
TEACHER PANEL	1. The instructor's guide was helpful to all teachers. 2. The in-service training was a valuable aid.	1. The instructor's guide require task descriptions. It was dif tion, and to ascertain what to 2. The frustration level of teach failures in the in-service tra 3. The training session did not m what had to be done.
TRENDS		

	RECOMMENDATIONS FOR REVISION
too much reading and duplicated cult to use, to locate informa- o next. s was high regarding equipment ing. e teachers totally aware of	1. With regard to the instructors' guide, the teachers suggested starting with a summary of the simulation (perhaps flow chart), an overview of the evaluation sheet, and a glossary of terms; condensing the rest of the material; and reorganizing to eliminate confusion and to provide more positive identification of resources. 2. In-service training should include instruction regarding equipment failures and tool and machine information (including safety factors and how to adjust for the gauge).

APPENDICES

APPENDIX A:

KNOWLEDGE TEST - "WHAT DO YOU KNOW?"

MANUFACTURING PRODUCTION

"WHAT DO YOU KNOW?"

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MANUFACTURING PRODUCTION

"What Do You Know?"

The purpose of this test is to help us find out what you and other students like you know about manufacturing production. This test does not in any way affect your grade.

DIRECTIONS: To complete the test first fill in the information requested at the top of the next page. For most questions on the test there are several short phrases or statements listed. Pick the one that best describes your answer and circle the letter in front of it. For several questions special directions will be included with the questions. Please follow those directions.

It you don't know the answer to a question, GUESS. When you have completed the test return it to your teacher.

Thanks for your help.

You may turn the page and start as soon as you have completed reading the directions.

MANUFACTURING PRODUCTION

"What Do You Know?"

FILL IN THE FOLLOWING INFORMATION:

Name _____ Date _____

School _____ City _____

Age _____

Grade (circle one) 8th 9th other (please specify)

Sex (circle one) Male Female

Subject taught in this class _____

START THE TEST

1. Which of the following skills or abilities would be beneficial to the majority of workers in the manufacturing industry?

   a. Ability to read
   b. Ability to understand and follow directions
   c. Ability to work with one's hands
   d. All of the above

2. An individual who performs poorly on the job affects

   a. The quantity and quality of the work produced
   b. Other workers on the production line
   c. The cost of production
   d. All of the above

3. Which one of the following would best describe the purpose of a production time schedule?

   a. To prevent the waste of time and money
   b. To prevent accidents in the plant
   c. To reduce the number of absent employees
   d. To reduce the amount of equipment maintenance needed

4. In manufacturing production many different kinds of tools are used to perform various functions. Match the function with the tool needed to perform the function by placing the letter of the function by the tool. Place only one letter by each tool.

Function	Tool
a. shaping	____ staple gun
b. fastening	____ glue gun
c. cutting	____ utility knife
d. grinding	____ screwdriver
	____ scissors
	____ box and pan brake
	____ rivet gun
	____ miter box saw
	____ tin snips
	____ sander
	____ soldering gun
	____ handsaw
	____ squaring shear

5. Which of the following things is manufactured?

a. Coal
b. Haircut
c. Candy bar
d. None of the above

6. Jobs can be thought of as being in "clusters" or grouped as to the field of work. Which one of the following groups of workers does not belong to the manufacturing cluster?

a. Astronomers
b. Welders
c. Glassworkers
d. Machinists
e. Cabinet makers

7. The most important factor to keep in mind when thinking of shop safety is that

a. Fast workers are usually safer than slow workers
b. Safety is everyone's responsibility
c. Machines are impersonal
d. The safety supervisor is in charge of safety

8. The Dandy Gadget Company manufactures a battery powered tie that flashes on and off and rotates. The tie is made for use at parties and is sold at most department stores. Recently the stores have been complaining that something is wrong with the electrical wires in the tie. The group that plans production at the company plant has determined that the cause is poor workmanship. Whom should they contact to correct the problem in future ties that are made?

   a. The quality control supervisor and plant workers
   b. The production coordinator and plant workers
   c. The plant superintendent and the safety supervisor
   d. The plant superintendent and the quality control supervisor

9. Which of the following items in manufacturing production are affected when tools and equpment are not kept in good condition?

   a. Quality of work
   b. Speed of operation
   c. Safety of operation
   d. All of the above

10. Widgels are manufactured on a tight schedule by the three step process shown below:

    Step A requires four highly skilled and specialized workers. If two of them get pneumonia what action should be taken to make sure that widgel production stays on its original time schedule?

    a. Hire more temporary specialized workers for step A
    b. Switch workers with different skills from step C to step A
    c. Make the remaining two workers in step A work twice as fast
    d. All of the above

11. Good production planning is indicated by:

    a. All workers doing the same job at the same time
    b. All workers being busy without waiting time
    c. All workers being satisfied and happy with their jobs
    d. Some high quality products being produced

12. Which of the following is <u>not</u> a main division of manufacturing?

    a. Administration
    b. Production
    c. Production Planning
    d. Research and Development
    e. Construction

13. Which of the following assignments would be a major responsibility of the plant maintenance supervisor?

a. Scheduling production time
b. Supplying tools
c. Analyzing defects in products
d. Planning new products

14. There are many different jobs associated with manufacturing production. Some of the job titles and job responsibilities are given below. Match the job titles with the job responsibilities by placing the letter of a single job title by the job responsibility it most closely describes. (You will need to use each job title more than once.)

Job Titles	Job Responsibilities
a. Supervisors b. Production workers c. Inspectors	____ Organize and conduct meetings for the training, planning and scheduling necessary for manufacturing products
	____ Have responsibility for setting up and operating machines used in manufacturing a product
	____ Examine and test manufactured products for exactness and neatness
	____ Assemble things in the manufacturing production process by using hand and power equipment
	____ Check manufactured products to make sure they are made well enough to be sold
	____ Monitor the production process and maintain personnel records

15. Assembling is a manufacturing process that can best be described as:

a. Inventing or developing things
b. Putting things together
c. Breaking things down into component parts
d. Making things run or operate

16. The purpose of quality control inspection is:

a. To make sure that each worker is working on schedule
b. To make sure that no one is horsing around on the job
c. To make sure that parts are made according to specifications
d. To make sure that all working areas are kept clean

17. Which of the following would the plant superintendent be most concerned about?

a. The general cleanliness and maintenance of the plant
b. Supervision of the safety practices of the plant
c. Maintaining a high level of production
d. Storage of finished products
d. None of the above

18. Which of the following manufacturing workers would be most frequently using gauges and measuring devices as the tools of his trade?

a. The plant superintendent
b. The production planner
c. The draftsman
d. The quality control inspector

As soon as you have completed this test, please turn it in to your teacher. Thank you.

APPENDIX B:

ATTITUDE SCALE - "WHAT DO YOU LIKE?"

MANUFACTURING PRODUCTION

WHAT DO YOU LIKE?

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MANUFACTURING PRODUCTION

WHAT DO YOU LIKE?

THIS IS NOT A TEST. The purpose of these questions is to find out the types of activities and jobs in manufacturing production you might enjoy doing. We would also like to learn what reasons you have for liking these activities and jobs.

There are only 14 questions to answer. Directions for answering are found at the top of the page or are included in the question.

After you have completed the questions, please return this booklet to your teacher. Thanks for your help.

Please begin the questions as soon as you have finished reading the above paragraphs.

MANUFACTURING PRODUCTION

"What Do You Like?"

FILL IN THE FOLLOWING INFORMATION:

Name _____ Date _____

School _____ _____ City _____

Age _____

Grade (circle one) 8th 9th other (please specify) _____

Sex (circle) Male Female

Subject taught in this class _____

Teacher's name _____

Turn to the next page after you have filled in the above information.

Directions: For the five questions below, place a check (✓) in the column which best describes whether you like, dislike or are uncertain about the activity described in the question. If you do not have enough information about the activity, check the last column. List reasons for your choice in the space provided at the right of the page.

Questions	Yes, I would like to try this	I'm uncertain about trying this	No, I would not like to try this	I don't have enough information to know if I would like to try this.	My Reasons For My Choice Are:
1. Would you like to work in that phase of manufacturing production which puts things together to make a completed product?					
2. Would you like to work in that phase of manufacturing production which makes things out of raw or other materials?					
3. Would you like to work in that phase of manufacturing production which examines and tests manufactured products for exactness and neatness?					
4. Would you like to work in that phase of manufacturing production which looks for and replaces worn tools and machine parts?					
5. Would like to work in that phase of manufacturing production which has overall responsibility for overseeing the production process?					

Directions: For this question (#6) name any five jobs that you know people do in manufacturing production. (If you don't know five jobs, name as many as you do know.) Then check (✓) the column which best describes how you would feel about working in this job. In the space at right, list the reasons for your checkmark.

An example is given below to help you complete this question.

Question	Yes, I would like this job.	I'm uncertain about this job.	No, I would not like this job.	My reasons are:
EXAMPLE: Sheet Metal Worker	✓			1. I like to make different things from all kinds of metal. 2. My neighbor is a sheet metal worker and I would like to try to use some of the power tools I have seen.
Manufacturing Production Job #1				
Manufacturing Production Job #2				
Manufacturing Production Job #3				
Manufacturing Production Job #4				
Manufacturing Production Job #5				

7. What kinds of experiences or activities do you think people should have before they select a job in the world of work? Briefly describe or list your ideas below.

8. Have you ever thought about how you would go about selecting a job? What are the most important things that you feel people should consider before they select or decide upon a job in the world of work? Briefly describe or list your ideas below.

9. Pretend that you have interviewed for several different jobs in the last few days. Yesterday two employers called you and each offered you a job in their organization. Both employers want you to decide within two days whether or not you are going to accept their offer. Briefly describe below how you would arrive at your decision.

10. Listed below are some possible reasons why it is important for people to explore careers. Check (✓) the phrases which you think represent <u>important</u> reasons for you.

_____ you need to decide what kind of life-time job you want before you enter high school

_____ you are likely to make a wiser choice about a job if you know about many different kinds of jobs

_____ if you explore many different jobs you are more likely to find one which matches your interest, abilities and aptitudes

_____ everyone has to work so everyone must explore different occupations

_____ when exploring jobs it is as important to find out about those jobs you do not like as it is to find out about those jobs you do like

11. Pretend that a friend of yours has many hobbies and interests which could lead to an occupation. But, this friend doesn't know much about possible occupations related to these hobbies and interests.

What should your friend do? (Circle the letters of as many as apply)

a. Think the problem through with a counselor, teacher, parents and other interested adults.

b. Try several part-time jobs, moving from one to another until one seems best.

c. Plan visits and activities which will help in learning about occupations and workers.

d. Choose any occupation; it will probably agree with one of his/her interests.

e. Put off a choice; sooner or later one occupation will look better than the rest.

f. Don't know.

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12. During a typical week, about how much time do you spend talking with your friends and other people about jobs and career-related things you would like to do as an adult? (Circle one letter)

a. no time at all
b. less than 15 minutes
c. about 15 to 30 minutes
d. about 30 to 60 minutes
e. more than 60 minutes

13. At this point in your life, how important is it to you to explore potential occupations and gain a better understanding of the world of work?

Give reasons for your response.

a. very important
b. important
c. fairly important
d. not too important
e. unimportant

14. I would enjoy working where what I did depended on others getting their job done and where what I did was essential for others to do their job.

_____ Yes Why?

_____ No

Please return this booklet to your teacher. Thank you.

APPENDIX C:

STUDENT QUESTIONNAIRE - "WHAT DO YOU THINK?"

MANUFACTURING PRODUCTION

WHAT DO YOU THINK?

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MANUFACTURING PRODUCTION

"WHAT DO YOU THINK?"

Now that you have completed this simulation, the people who developed it would like to find out what you think about your experience. Your ideas will help to make the simulation better. Remember, THIS IS NOT A TEST and your answers will not be graded. So feel free to check and to say what you think about this simulation.

DIRECTIONS: To complete the questionnaire, first fill in the information requested at the top of the next page. Then there is a list of statements which describe a feeling or an idea about the simulation just completed. Answer each statement by circling the symbol which best matches your actual feeling:

(+) means the statement agrees with your feeling

(?) means you're not sure how you feel about the thing mentioned in the statement

(-) means the statement does not agree with your feeling

For several other questions, special directions will be included with the questions. Follow those directions.

When you have completed the questions, please return this booklet to your teacher.

Thanks for your help.

You may turn the page and start as soon as you have completed reading the directions.

MANUFACTURING PRODUCTION

"WHAT DO YOU THINK?"

FILL IN THE FOLLOWING INFORMATION:

Name _____ Date _____

School _____ City _____

Age _____

Grade (circle one) 8th 9th other (please specify) _____

Sex (circle one) Male Female

Subject taught in this class _____

Teacher's name _____

START THE QUESTIONS

Answer each statement by circling the symbol which best matches your actual feeling:

(+) means the statement agrees with your feeling

(?) means you're not sure how you feel about the thing mentioned in the statement

(-) means the statement does not agree with your feeling

	Circle one for each statement		
1. I learned quite a bit about jobs from the simulation.	+	?	-
2. I learned quite a bit about how to work with other people from the simulation.	+	?	-
3. To me the simulation was boring.	+	?	-
4. I would recommend the simulation to my friends	+	?	-

		Circle one for each statement		
5.	I would like to go through more simulations like this one.	+	?	-
6.	I would have rather done something else during the time I worked with the simulation.	+	?	-
7.	The simulation helped to answer some of the questions I have about jobs.	+	?	-
8.	The simulation took too long.	+	?	-
9.	The simulation was over too soon for me.	+	?	-
10.	Some of the tasks were too complicated or too hard for me to do.	+	?	-
11.	The summary helped me to "pull things together."	+	?	-
12.	I enjoyed working with other students during the simulation.	+	?	-
13.	The activities that I did in the simulation were exciting to me.	+	?	-
14.	I often had trouble knowing what to do next in the simulation.	+	?	-
15.	This simulation was a good way of getting out of class.	+	?	-
16.	There were too many tests and forms to fill out with this simulation.	+	?	-
17.	The pretest and posttest were difficult for me.	+	?	-
18.	The simulation preview, activities, and summary fit together well.	+	?	-
19.	The preview and the other activities at the beginning helped to prepare me for the simulation.	+	?	-
20.	I liked the way I selected my role(s) in the simulation.	+	?	-

For the next questions, either write in your answers or check (✓) the appropriate answers as indicated in the question.

21. What was your role (or roles) in the simulation "Manufacturing Production"? (Check all that apply)

____ Band Saw Operator
____ Boring Machine
____ Box Printer
____ Electronics Assembler
____ Electronics Component Inspector
____ Fabrication Inspector
____ General Inspector
____ Gluer II
____ Grinder I
____ Hand Assembler
____ Hand Cutter I
____ Hand Cutter II
____ Hand Driller II
____ Hand Packager
____ Hand Riveter
____ Hand Sander
____ Lead Former
____ Machine Cleaner
____ Machine Helper
____ Maintenance Supervisor
____ Marker
____ Material Handler
____ Metal Fabricating Inspector
____ Packager
____ Paperboard Box Maker
____ Paperboard Boxes Inspector
____ Plant Superintendent
____ Portable Machine Sander
____ Porter II
____ Production Assembler
____ Production Coordinator
____ Production Supervisor
____ Quality Control Supervisor
____ Rubber
____ Scorer
____ Shear Operator I
____ Sheet Metal Brake Operator
____ Sheet Metal Layout Man
____ Small Parts Assembler
____ Wireworker
____ Woodworking Machine Operator

22. Do you think that you performed well in this role (or roles)?

____ Yes, all of the time
____ Yes, most of the time
____ No, not usually
____ No, not at all

23. List a few reasons why you like or did not like your role (or roles).

24. Would you choose this role (or roles) if you were going to be in the simulation again?

____ Yes
____ Not sure
____ No

25. Describe the one thing which you feel you did best in the simulation and the one thing you did least well. Be sure to say why you did well or poorly.

Best Thing	Reasons	Worst Thing	Reasons

26. What other roles in the simulation did you find interesting? (Check all that apply.)

____ Band Saw Operator
____ Boring Machine
____ Box Printer
____ Electronics Assembler
____ Electronics Component Inspector
____ Fabrication Inspector
____ General Inspector
____ Gluer II
____ Grinder I
____ Hand Assembler
____ Hand Cutter I
____ Hand Cutter II
____ Hand Driller II
____ Hand Packager
____ Hand Riveter
____ Hand Sander
____ Lead Former
____ Machine Cleaner
____ Machine Helper
____ Maintenance Supervisor
____ Marker
____ Material Handler
____ Metal Fabricating Inspector
____ Packaging Sealer
____ Paperboard Box Maker
____ Paper Products Inspector
____ Plant Superintendent
____ Portable Machine Sander
____ Porter II
____ Production Assembler
____ Production Coordinator
____ Production Supervisor
____ Quality Control Supervisor
____ Rubber
____ Scorer
____ Shear Operator I
____ Sheet Metal Brake Operator
____ Sheet Metal Layout Man
____ Small Parts Assembler
____ Wireworker
____ Woodworking Machine Operator

27. Why do you find this role (or roles) interesting? If you do not find any other roles interesting, can you explain why?

28. Compared to your feelings about the work involved in Manufacturing Production before this simulation, how do you feel now?

	Why?
____ I am more interested now	
____ I am less interested now	
____ I do not feel any different now	

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29. Did you discover any new interests by participating in this simulation?

____ Yes, I am now interested in _____

____ No

30. Name some of the things you liked most about the simulation and some of the things you liked least about the simulation.

Liked Most	Liked least
_____	_____
_____	_____
_____	_____

31. Write down some of your ideas on how the simulation might be made better.

As soon as you have completed these questions, turn in this booklet to your teacher.

Thank you.

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APPENDIX D:

TEACHER EVALUATION LOG

MANUFACTURING PRODUCTION

TEACHER EVALUATION LOG

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TEACHER EVALUATION LOG

Module Title MANUFACTURING PRODUCTION

Teacher Name _____
School _____
City _____

GENERAL INSTRUCTIONS

This instrument package is designed to obtain your reactions related to the simulation module which you are pilot testing as part of the Occupational Exploration Program. Your close association with the module places you in a unique position to evaluate overall quality, to note problems and to offer suggestions for further development and/or refinement. Hence, your candid appraisal of the module is sought by its developers. Your feedback will give direction to the revision process, which will be the next step in developing the module.

The package consists of several parts arranged in the order in which they should be used. These parts are described briefly in the table below. Please note that while this booklet seems lengthy, each part only requires a short amount of time to complete and the parts are spaced out over the classroom life of the module.

	PART	WHEN TO COMPLETE	Estimated Time Required
I.	Introduction to Simulation	Upon completion of the Introduction	5-10 minutes
II.	Module Preview	Upon completion of Preview	5 minutes
III.	Preparation Phase	Upon completion of the Phase	5-10 minutes
IV.	Participation Phase (task evaluation)	As students complete each task	5-10 minutes per task
V.	Summary Phase	Upon completion of the Phase	3-5 minutes
VI.	General Module Evaluation	Upon Completion of Posttesting	15-20 minutes

Part I: INTRODUCTION TO SIMULATION

SIMULATION - AN EXCITING WAY TO LEARN

Part I: INTRODUCTION TO SIMULATION

SIMULATION - AN EXCITING WAY TO LEARN

Complete this part after your students have seen the slide presentation introducing the idea of simulation, have read the booklet which covers the same ideas or have used both the slides and booklet together. This part consists of several brief questions about the introduction to simulation. To respond, circle the letter of the phrase that best describes your answer. Several questions will require that you supply a short answer. Space has also been provided for you to write in any comments you have. You are encouraged to do so.

Thanks for your help.

1. How many total students in your class were introduced to the concept of simulation by one or both of the means described above?

   _____ students

2. How many students used: (count each student only once)

   _____ The booklet only
   _____ The slides only
   _____ The slides first and then the booklet
   _____ The booklet first and then the slides
   _____ Other, please specify _____

3. Were the students able to understand concepts presented in the materials?

   a. Yes, most of the time — Comments
   b. Somewhat
   c. No, not much of the time

4. Was the vocabulary consistent with the maturational level of the students?

   a. Yes, most of it — Comments
   b. Some of it
   c. No, not much of it

5. How would you rate the quality of the illustrations used on the slides and in the booklet? (Answer both parts of the question.)

Slides	Booklet	Comments
a. Very Good	a. Very Good	
b. Good	b. Good	
c. Average	c. Average	
d. Poor	d. Poor	
e. Very Poor	e. Very Poor	

6. Overall, how would you rate the technical quality (appearance, ease of use, etc.) of the slides and booklet? (Answer both parts of the question.)

Slides	Booklet	Comments
a. Very Good	a. Very Good	
b. Good	b. Good	
c. Average	c. Average	
d. Poor	d. Poor	
e. Very Poor	e. Very Poor	

7. Overall, do you feel that this introduction was stimulating to students?

	Comments
a. Yes, very much	
b. Somewhat	
c. No, not much	

8. In what order would you recommend the use of the slides and the booklet? (Choose only one.)

	Comments
a. Use both in any order	
b. Use both with the booklet first	
c. Use both with the slides first	
d. Use the booklet only	
e. Use the slides only	
f. None of the above	

9. Would you recommend the use of the slides and/or the booklet to other teachers? (Answer both parts of the question.)

Slides	Booklet	Comments
a. Yes, with minor modification	a. Yes, with minor modification	
b. Yes, with major modification	b. Yes, with major modification	
c. No, I would not recommend it	c. No, I would not recommend it	

Please write in any other comments/suggestions you might have in the space below. (If extra space is required, use the back of this page.)

Part II: MODULE PREVIEW

Part II: MODULE PREVIEW

Complete this part when your students finish the "Preview" section of the module. Please rate each form used by your students by checking (✓) the appropriate box in each applicable cell. You are encouraged to place comments and/or descriptions of any problems you encountered in the large spaces provided in each box. (Note: Answer only for the forms of the preview that your students used and count students only one time each for the second column.)

Form of Presentation	# of students using this form	Rate the effectiveness of this form in stimulating student interest	Rate the technical quality (ease of use, appearance, etc.) of this form.	Rate the quality of this form in providing pertinent information to students making decisions about mod le participation	Overall, how would you rate the educational quality or worth of this "Preview" form	Write in any other suggestions you have for improving the Module Preview. Also describe what you considered to be the strong points of the preview
		High Med Low	High Med Low	High Med Low	High Med Low	
Illustrated Booklet		Comments	Comments	Comments	Comments	Suggestions
Sound-slide, film, filmstrip, etc.		Comments	Comments	Comments	Comments	
Game or similar activity		Comments	Comments	Comments	Comments	Strengths
Other, or some combination of the above forms (please specify)		Comments	Comments	Comments	Comments	

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PART III - PREPARATION PHASE

PART III: PREPARATION PHASE

Complete this part after your students have finished the preparation phase of the simulation module. Questions here relate to the materials used to prepare students for participating in the simulation and the actual process of getting students into roles.

To respond, circle the letter of the choice that best describes your answer or how you feel. Some questions will require that you either check (✓) an answer or write in a short response. Space has also been provided for you to write any comments or suggestions you might have. You are encouraged to do so.

Thanks for your help.

MATERIALS

1. In the following chart: describe or name the form of material used (e.g., slide tapes, booklets, combination of forms, etc.); specify how many students used the form counting each student only once; rate the technical quality of the form; and rate its overall educational quality or worth.

   Ratings are indicated by placing a check (✓) in the appropriate box in the applicable cell. You are encouraged to place comments and/or descriptions of problems you encountered in the large space provided in each box.

Name of Form	No. of students	Rate the technical quality (appearance, ease of use, etc.) of the form				Rate the Overall Educational Quality of the Form			
		High	Med	Low	Comments	High	Med	Low	Comments
					Comments				Comments
					Comments				Comments
					Comments				Comments

2. Were the students able to understand the concepts presented in the materials?

   a. Yes, most of the time
   b. Somewhat
   c. No, not much of the time

   Comments

3. Was the vocabularly consistent with the maturational level of the students?

a. Yes, most of it
b. Some of it
c. No, not much of it

Comments

4. To what extent was the preparation phase integrated with (i.e., how well did it fit together with) the Module Preview?

a. Very well, integrated
b. Well integrated
c. Somewhat integrated
d. Poorly integrated
e. Very poorly integrated

Comments

ROLE SELECTION PROCESS

5. Did the initial role descriptions provide students with enough information for selecting roles?

a. Yes, the information was adequate
b. Somewhat
c. No, the information was inadequate

Comments

6. If schematic devices (e.g., schedule cards were available to help select roles, did students understand how to use them?

a. Yes, with little or no help
b. Yes, with some help
c. Yes, with a great deal of help
d. No
e. Not applicable

Comments

7. Were the students able to independently select themselves into roles?

a. Yes, with little difficulty
b. Yes, with some difficulty
c. No, some teacher assistance was necessary
d. No, extensive teacher assistance or direction was necessary

Comments

8. If you had to help the students select roles, please describe the nature of that assistance (e.g., asked students to draw lots when several wanted the same role; explained use of schematic device; etc.) in the space below.

9. Overall, was the role selection process described in the module an effective way of getting students into roles?

   a. Yes, it was effective — Comments
   b. Somewhat effective
   c. No, it was ineffective

10. Can you suggest other ways in which this process could occur?

   a. Yes, I would suggest _____

   _____

   _____

   _____

   _____

   b. No, the process was effective

Please write in any other comments/suggestions you might have in the space below.

PART IV - PARTICIPATION PHASE

TASK EVALUATION

SKILLS PACKET

PART IV - TASK EVALUATION

Tnis part should be completed on a task by task basis as your students finish each task during the participation phase of the simulation module. Please write in the number of each task and answer the questions listed at the top of each column. IN THE "PROBLEM AREA" SECTION, PLACE A CHECK (✓) IN THE APPROPRIATE CELLS WHENEVER PROBLEMS OCCUR FOR A PARTICULAR TASK. Please write any comments, problem descriptions, and/or suggestions you have in the spaces provided.

A sample of a task evaluation is provided to help you complete this form.

Task number	Class time spent on task in minutes	Teacher time spent working directly with students in minutes	Is recommended time appropriate for completing task?	Did you modify, delete, or change the position of this task in the simulation? (Specify change)	MAJOR PROBLEM AREAS: Appropriateness of task to maturational level of students	Integration of task with previous, concurrent, and/or following tasks	Resource materials	Special skills required of teacher and/or instructional techniques for implementing the task.	Student understanding of task directions and/or task materials	Student implementation of task
SAMPLE 2A	150	35	TAKES TWICE AS LONG AS ESTIMATED TIME			THIS TASK REALLY FOLLOWED UP ON IDEAS FROM PREVIOUS ONE			✓ DIRECTIONS WERE UNCLEAR ESPECIALLY FOR ROLE DESCRIPTIONS	

PART IV - TASK EVALUATION

Task number	Class time spent on task in minutes	Teacher time spent working directly with students in minutes	Is recommended time appropriate for completing task?	Did you modify, delete, or change the position of this task in the simulation? (Specify change)	MAJOR PROBLEM AREAS					
					Appropriateness of task to maturational level of students	Integration of task with previous, concurrent, and/or following tasks	Resource materials	Special skills required of teacher and/or instructional techniques for implementing the task.	Student understanding of task directions and/or task materials	Student implementation of task
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

Task number	Class time spent on task in minutes	Teacher time spent working directly with students in minutes	Is recommended time appropriate for completing task?	Did you modify, delete, or change the position of this task in the simulation? (Specify change)	MAJOR PROBLEM AREAS					
					Appropriateness of task to maturational level of students	Integration of task with previous, concurrent, and/or following tasks	Resource materials	Special skills required of teacher and/or instructional techniques for implementing the task.	Student understanding of task directions and/or task materials	Student implementation of task

PART IV - TASK EVALUATION

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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

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					Appropriateness of task to maturational level of students	Integration of task with previous, concurrent, and/or following tasks	Resource materials	Special skills required of teacher and/or instructional techniques for implementing the task.	Student understanding of task directions and/or task materials	Student implementation of task
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

Task number	Class time spent on task in minutes	Teacher time spent working directly with students in minutes	Is recommended time appropriate for completing task?	Did you modify, delete, or change the position of this task in the simulation? (Specify change)	MAJOR PROBLEM AREAS					
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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

Task number	Class time spent on task in minutes	Teacher time spent working directly with students in minutes	Is recommended time appropriate for completing task?	Did you modify, delete, or change the position of this task in the simulation? (Specify change)	MAJOR PROBLEM AREAS					
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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - TASK EVALUATION

Task number	Class time spent on task in minutes	Teacher time spent working directly with students in minutes	Is recommended time appropriate for completing task?	Did you modify, delete, or change the position of this task in the simulation? (Specify change)	MAJOR PROBLEM AREAS					
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					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐
					☐	☐	☐	☐	☐	☐

PART IV - SKILL PACKETS

In some of the Occupational Exploration simulation modules it is likely that students may be asked to occasionally engage in activities with which they have little or no background. This lack of background will not significantly impede the operation of the module but students might feel somewhat more comfortable with the activity if their background could be enhanced. To help in providing that background, skill packets, (e.g., a "drawing skills" packet, metric system skill kit, etc.) have been included with several modules. Fill in the chart below for all skill packets provided with the module being used in your classroom. Write in the name of the skill packet (s), write in the number of students using the packet, and then answer all questions listed at the top of each column by placing a check (✓) in the appropriate box. Please comment in the space provided with regard to any problems you might have encountered or any suggestions you might have.

Name of skill packet	# of Students using this packet	Rate this packet in terms of providing information needed by students				Rate the difficulty of packet in terms of maturational level of your students				Other Comments/Suggestions (Indicate: problems with skill packets; revision suggestions; other materials that might be used; etc.)
		High	Med	Low	Comments	Too hard	Just right	Too easy	Comments	
					Comments				Comments	
					Comments				Comments	
					Comments				Comments	

PART V: SUMMARY PHASE

PART V: SUMMARY PHASE

Complete this part when your students complete the "Summary" phase of the module. To respond, simply circle the letter beside the phrase that best describes your answer or supply the requested information. Space has also been provided for you to write in any comments/suggestions you may have.

Thanks for your help.

1. How effective was the "Summary" phase in providing a reasonable culimination to the simulation experience?

   a. Very effective
   b. Somewhat effective
   c. Not effective

   Comments

2. Was the "Summary" phase well integrated with the immediately preceding activities or tasks?

   a. Yes
   b. Somewhat
   c. No

   Comments

3. Did you have to modify or expand upon the "Summary"?

   a. Yes, I did the following _____

   _____

   b. No

4. How effective was the "Summary" phase in helping students learn about occupational roles performed by others in the simulation?

   a. Very effective
   b. Somewhat effective
   c. Not effective

   Comments

5. How effective was the "Summary" phase in helping students learn about tools, processes and working conditions associated with that part of the world of work simulated in the module?

   a. Very effective
   b. Somewhat effective
   c. Not effective

   Comments

6. How useful do you feel the "Summary" phase would be in helping students identify and select alternatives for further action related to other occupational exploration activities?

a. Very useful
b. Somewhat useful
c. Not useful

Comments

Please write in any other comments/suggestions that you might have in the space below.

Part VI: GENERAL MODULE EVALUATION

Part VI: GENERAL MODULE EVALUATION

These questions should be answered as soon as possible after the pilot test of this module has been completed, i.e., after the posttests have been given.

The questions are divided into several sections. The first section deals with general background characteristics of students and teachers. This information will be used solely for the purpose of describing the students and teachers who participated in the pilot test of this module. Subsequent sections will deal with implementational problems, your perceptions of the quality of the materials, etc.

Fill in the information requested at the top of the questions and then answer each question by circling the letter in front of the phrase that best describes your answer, unless given other specific directions in the question. Space has also been provided for you to write in any comments/suggestions you might have. You are encouraged to do so.

Fill in the following information

Teacher Name _____

School _____

City _____

Date _____

TEACHER BACKGROUND

1. What is your sex?

   a. Male
   b. Female

2. Including this year, approximately how many years of teaching experience do you have?

   a. This is my first year
   b. 2-4 years
   c. 4-6 years
   d. 6-8 years
   e. 8 or more years

3. In what kind of group setting (e.g., English classroom, math classroom, students from study hall, students from a guidance group, etc.) and at what grade level did you introduce this simulation?

   a. Group Setting (please specify) _____
   b. Grade Level (please specify) _____

4. Have you had any previous experience with simulation as an instructional technique?

   a. Yes, as a teacher
   b. Yes, as an observer
   c. Yes, as a participant
   d. No

5. If you answered yes to question 4, briefly describe the nature and extent of your previous experiences with simulation. If your response to question 4 was 'No' please proceed to question 6.

   a. My previous experiences with simulation include _____

   _____

   _____

   _____

6. Which of the following statements best describes your reasons for participating in the pilot test of this simulation module?

   a. To try out new ways of organizing instruction for students
   b. Interest in Career Education
   c. Thought material was of value for students
   d. General interest or curiosity
   e. I was requested to participate
   f. Other, or some combination of the above (please specify) _____

   _____

STUDENT BACKGROUND

7. How many students participated in the total simulation? (Include only those students who were involved in the module and received both the pre and posttests).

_____ Students Participating

8. Of the students in question 7, how many were male and how many were female?

_____ Males _____ Females

9. How were students selected to participate in the simulation?

a. Most of the students were volunteers from the class
b. The class, rather than the students, was volunteered
c. Student volunteers from a study hall
d. Other, please specify _____

_____

10. If you had volunteer students participating in the simulation which of the following reasons best describes your perception of why they participated. If you did not have any volunteer students please proceed to Question 11.

a. Interest in trying something new
b. Interest in particular area simulated
c. Interest in careers
d. Interest in just getting out of class or study hall
e. Other, or some combination of the above (please specify)

_____

_____

f. I can't really guess at the reason (s)

11. Indicate any special characteristics of this class, e.g., many slow readers in class; many students with exceptionally good verbal skills; etc., which may bias the results of the pilot test of this module. Also describe how you feel the results will be biased by these characteristics.

a. Characteristics Biases Produced

_____ _____

_____ _____

_____ _____

b. No special characteristics

SEQUENCING OF MATERIALS

12. In general, how well did the transition from phase to phase of the module proceed?

a. Very well
b. Well
c. About average
d. Poorly
e. Very poorly

Comments

13. Are there any additions, deletions or changes in the order of module parts that you feel should be made?

a. Yes, make the following changes _____

_____

_____

b. No changes are necessary

ADEQUACY OF MATERIALS

14. In general, were the directions in the module clear enough for students to understand what was expected of them?

a. Yes
b. Somewhat
c. No

Comments

15. In general, was the vocabulary of the module consistent with the maturational level of the students in the simulation?

a. Yes
b. Somewhat
c. No

16. Do you feel that the knowledge (What do you know?) and the attitude (What do you like?) tests were adequate measures of the material contained in the module? (Answer both parts of the question.)

Knowledge Test	Comments	Attitude Test	Comments
a. Yes		a. Yes	
b. Somewhat		b. Somewhat	
c. No		c. No	

17. To what extent was the knowledge test difficult for students?

a. Very difficult
b. Difficult
c. About average
d. Easy
e. Very easy

Comments

IMPLEMENTATION OF THE MODULE

18. How well did the in-service training prepare you to work with this module?

a. Very well
b. Well
c. Somewhat
d. Poorly
e. Very poorly

Comments

19. Did the in-service training provide you with a general understanding of your role in the module implementation?

a. Yes
b. Somewhat
c. No

Comments

20. While working with this module, did you have to allot (or spend) more time than you normally would for preparation (exclude the time spent in in-service training)?

a. Yes, specify additional time in hours _____
b. Some extra time was necessary
c. No extra time was necessary

Comments

21. How sizeable was the job of managing/coordinating this simulation module for you?

a. Very sizeable
b. About average
c. Not sizeable

Comments

STUDENT PARTICIPATION AND LEARNING

22. Did your students experience problems with the reading level of this module?

a. Yes — Comments
b. Somewhat
c. No

23. To what extent do you feel students were receptive (interested in, excited by) to simulation as a way of learning?

a. Very receptive — Comments
b. Receptive
c. About average
d. Non-receptive
e. Very non-receptive

24. To what extent do you feel that students were receptive (interested in, excited by) to the content of this particular module?

a. Very receptive — Comments
b. Receptive
c. About average
d. Non-receptive
e. Very non-receptive

25. Was there any change in student interest or motivation as they progressed through the module?

a. Yes, interest changed as follows _____
_____
b. Somewhat
c. No

26. Do you feel that this module reinforced or helped to build the student's ability to make decisions?

a. Yes — Comments
b. Somewhat
c. No
d. Don't know

27. In your judgment, how much did students learn about the process of simulation and about the content of the module? (Answer both parts of the question)

Simulation Process	Comments	Module Content	Comments
a. Very Much		a. Very Much	
b. Much		b. Much	
c. An average amount		c. An average amount	
d. Little		d. Little	
e. Very little		e. Very little	

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OVERALL PERCEPTIONS AND RECOMMENDATIONS

28. In general was this module

a. Exciting to students. Comments
b. About average for students.
c. Boring to students.

29. In general did this module change the working relationships (personal interactions) between you and participating students?

a. Yes, relationship changed as follows _____

_____

_____

b. Somewhat
c. No

30. Are there any students or groups of students (e.g., some students may have difficulty working in small self-directed groups) that you feel would have difficulty participating in simulated types of experiences?

a. Yes, (please specify) _____

_____

_____

b. No

31. For what grades would you consider this module to be appropriate? (Circle as many as apply).

a. 10th or higher Comments
b. 9th
c. 8th
d. 7th or lower
c. Other, please specify _____

32. Overall, how would you rate the quality of this module?

a. Very good Comments
b. Good
c. Average
d. Poor
e. Very Poor

33. If possible, would you use this module with students again?

a. Yes, with no modification — Comments
b. Yes, with minor modifications
c. Yes, with major modifications
d. No

34. Would you recommend this module to other teachers?

a. Yes — Comments
b. No

COMMENTS AND/OR SUGGESTIONS FOR REVISION

Add as many comments and/or suggestions for revision of the module as you might have.

Thank you for your help in evaluating this simulation module.